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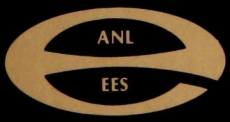
Estimated Monthly Emissions of Sulfur Dioxide, Oxides of Nitrogen, and Volatile Organic Compounds for the 48 Contiguous States, 1985-86

Volume 1: Interim Update and Methodology Review

E. J. Kohout, D. A. Knudson, C. L. Saricks, and D. J. Miller



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by

E.J. Kohout, D.A. Knudson, C.L. Saricks,
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Energy and Environmental Systems Division
Policy and Economic Analysis Group

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FOREWORD

This report presents monthly SO_2, NO_x, and volatile organic compound (VOC) emission estimates for all states in the contiguous United States for 1985 and 1986. This work has been funded as part of the National Acid Precipitation Assessment Program's Emissions and Controls Task Group by the U.S. Department of Energy (DOE) Office of Fossil Energy. The DOE Project Officer is Edward Trexler.

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The report is presented in two volumes. Volume 1 presents emission estimates for NO_x, SO_2, and VOCs for 1985 and 1986 and gives an overview of sectoral, regional, and seasonal emission trends. In addition, Volume 1 discusses the methodology used to compute the 1985 and 1986 estimates. The appendixes in Vol. 1 contain tables and graphs that give specific data on these emission trends. Volume 2 consists of the last appendix, which contains detailed tables of the emission estimates by pollutant and sector for every state and month.

For information about the 1975-1984 NO_x and SO_2 emission estimates and methodology, the reader is referred to the ANL report preceding this report, titled *Estimated Monthly Emissions of Sulfur Dioxide and Oxides of Nitrogen for the 48 Contiguous States, 1975-1984*, Vols. 1 and 2, Argonne National Laboratory Report ANL/EES-TM-318 (1986).

ESTIMATED MONTHLY EMISSIONS OF SULFUR DIOXIDE, OXIDES OF NITROGEN, AND VOLATILE ORGANIC COMPOUNDS FOR THE 48 CONTIGUOUS STATES, 1985-86

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E.J. Kohout, D.A. Knudson, C.L. Saricks,
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1 INTRODUCTION

The purpose of this report is threefold. First, it reports recent trends in sulfur dioxide (SO_2) and oxides of nitrogen (NO_x) emissions. This work is part of a continuing study of the seasonal and regional patterns of these pollutants. An earlier Argonne National Laboratory (ANL) report, *Estimated Monthly Emissions of Sulfur Dioxide and Oxides of Nitrogen for the 48 Contiguous States, 1975-1984,*[1] presented estimates of NO_x and SO_2 emissions that were developed for each month by state. This report extends the NO_x and SO_2 series to 1985 and 1986. In addition, emission estimates are introduced for a new class of pollutants, volatile organic compounds (VOCs). The VOC estimates are given for 1985 and 1986 by month and state.

Second, this report discusses how the estimating methodology used in this update differs from that used in the previous report. Our intent was to prepare emission estimates for a given year as soon as possible after that year. Consequently, to obtain more timely data, some data were taken from sources other than those used in the previous report. Although the methodology differs slightly, we took care to minimize the effects of the changes. Other changes were made to the methodology to generate more accurate estimates for VOC emissions, particularly in the transportation sector.

Third, this report examines areas in which the methodology could be improved. Changes in the methodology and improvements in the data sources could result in more accurate and efficient estimates of pollution emissions.

1.1 SUMMARY OF ESTIMATION METHODOLOGY

Before describing emission trends, we will summarize the methodology used to estimate emissions here in this section (this methodology is discussed in detail in Secs. 4 and 5). To keep the time trends compatible, the methodology used for this update was kept the same as the previous ANL approach wherever possible. In the earlier report, emission estimates from 19 or 20 national emission sectors (depending on the pollutant) were obtained from *National Air Pollutant Emission Estimates, 1940-1984.*[2] The totals of these sectoral estimates were equal to the national totals for every year, and they corresponded to those sectors with significant levels of emissions (e.g., electric utilities, transportation, industrial fuel combustion). Next, state shares of emissions from these

sectors were computed from the 1980 National Acid Precipitation Assessment Program (NAPAP) emissions inventory data. These state shares were used to estimate annual sectoral emissions in every state. Then monthly indices were developed for each emission sector, based on activity in that sector. These indices were used to apportion the annual data for every month.

As noted above, the methodology used to compute the 1985 and 1986 NO_x and SO_2 estimates was changed somewhat from that used to compute the 1984 and earlier estimates. Specifically, the national emission sector data previously obtained from Ref. 2 had to be estimated.* To do so, we used sectoral activity indices to estimate growth in these sectors since the base year of 1984. Then the new sector total was computed on the basis of this growth and the sector's total in 1984. Once new sector totals were estimated, the methodology remained exactly as it was before.

A similar methodology was used to extend the VOC emission estimates from 1985 to 1986. The 1985 VOC estimates presented here are based on an update of Ref. 2 national sectoral totals for 1985. These estimates were extended to 1986 with sectoral activity indices.

1.2 ORGANIZATION OF THE REPORT

The methodology used to estimate emissions was just described in the first section of this volume. Sections 2 and 3 discuss trends in emissions. Section 2 analyzes national emission trends, with emphasis on emissions from electric utilities. Emissions data by month and state are given in App. A. In Sec. 3, these data are grouped to show seasonal and regional emission trends. Appendixes B-D contain tables and graphs with detailed data on these trends. Sections 4 and 5 describe the methodology used to compute the 1985 and 1986 estimates. Section 4 presents a general description of the methodology used for NO_x and SO_2 estimates, along with a detailed description of methodology changes for the current estimates. Section 5 describes the methodology used to estimate VOC emissions. Section 6 presents proposals for methodology improvements. The planned improvements will incorporate additional detailed analyses for important sources of emissions where warranted. Volume 2 contains App. E, which provides detailed emissions tables by sector, month, and state for 1985 and 1986.

*At the time these data were estimated, the EPA 1985 figures were not available.

2 NATIONAL AND SECTORAL EMISSION TRENDS

This section presents some observations on national emission levels for SO_2, NO_x, and VOCs. Trends for SO_2 and NO_x are analyzed from 1975 through 1986, although recent trends are stressed. In addition, sectoral trends and their effect on the national trend are discussed. The utility sector has a significant effect on national SO_2 and NO_x emission levels, so that sector is emphasized. Monthly state estimates of VOC emissions are available in this report only for 1985 and 1986, so discussion is necessarily limited to those two years.

2.1 SUMMARY OF NATIONAL EMISSION TRENDS

National emission trends for SO_2 and NO_x from 1976 through 1986 are presented in Fig. 1, and national trends for electric utility emissions are presented in Fig. 2. National emissions of SO_2 continued to decline moderately in 1985 and 1986 to 21.2 and 21.1 x 10^6 metric tons, respectively. Steady or moderately declining levels of emissions from electric utility plants accounted for most of the trend, although declining or steady emission levels in all sectors also contributed. Since reaching a peak in 1977, national levels showed a 21% decrease through 1986, and a 10% decrease from 1980 levels.

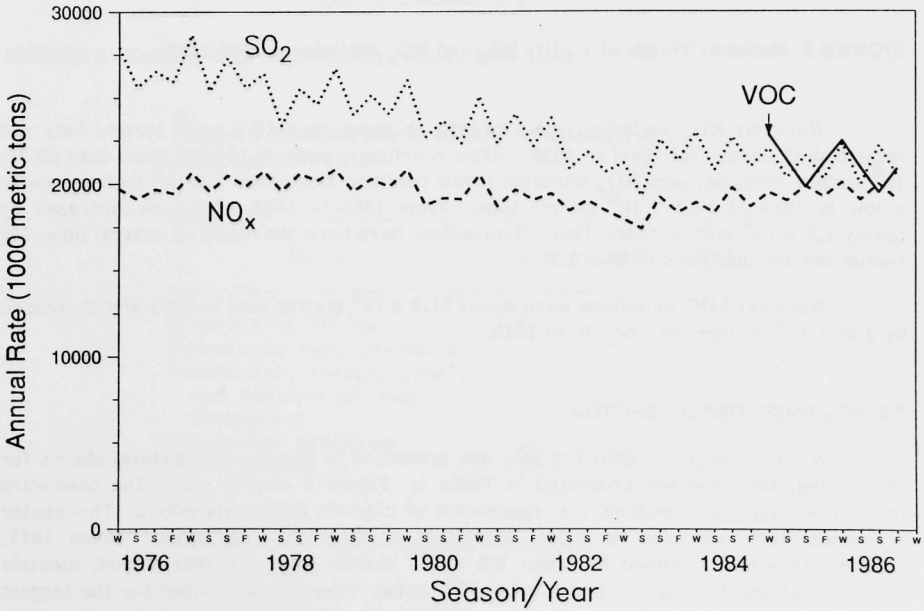

FIGURE 1 National Trends of SO_2, NO_x, and VOC Emissions, 1976-1986

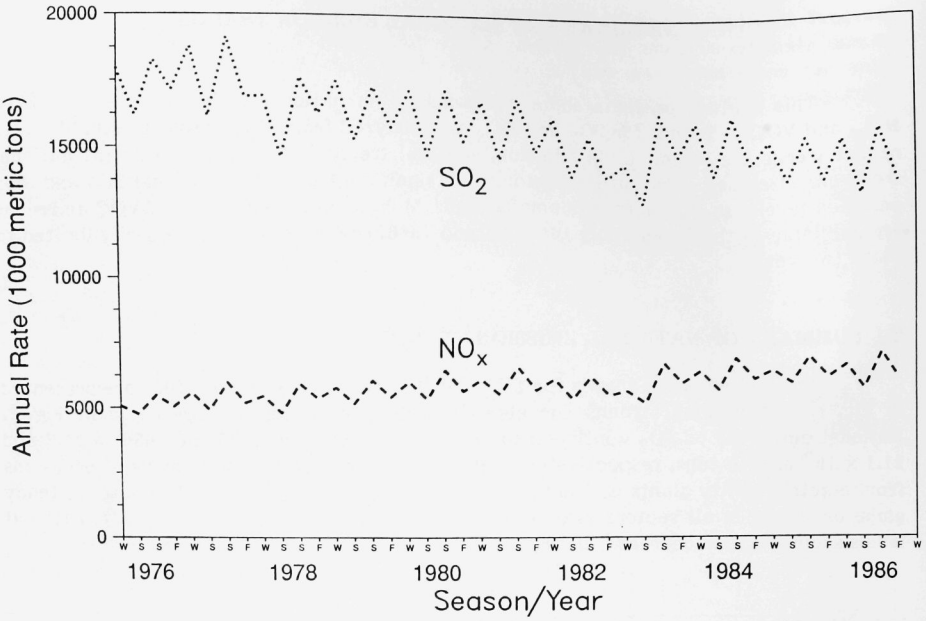

FIGURE 2 National Trends of Utility SO_2 and NO_x Emissions, 1976-1986

National NO_x emissions rose in 1985 to more than 19.5 x 10^6 metric tons and remained at about that level in 1986. After reaching a peak in 1978 of more than 20.3 x 10^6 metric tons, national NO_x emission levels declined more than 2 x 10^6 metric tons to a low in 1983 of 18.2 x 10^6 metric tons. From 1983 to 1985, emissions increased by nearly 1.3 x 10^6 metric tons. These fluctuations have been the result of several opposing trends and are discussed in Sec. 2.2.

National VOC emissions were about 21.3 x 10^6 metric tons in 1985 and decreased by 0.35 x 10^6 metric tons, or 2%, in 1986.

2.2 SO_2 EMISSIONS BY SECTOR

National sector trends for SO_2 are presented in Fig. 3, and sectoral shares for 1977, 1980, and 1986 are presented in Table 1. Figure 3 clearly shows the downward trend in emissions, as well as the importance of electric utility emissions. This sector has consistently contributed about two-thirds of total SO_2 emissions. Since 1977, national emissions declined by about 5.5 x 10^6 metric tons. In that period, electric utility emissions declined by about 3.3 x 10^6 metric tons and accounted for the largest share, 61%, of the nation's decrease from 1977 levels. The proportion of electric utility emissions in the national total, however, remained constant over the period. The

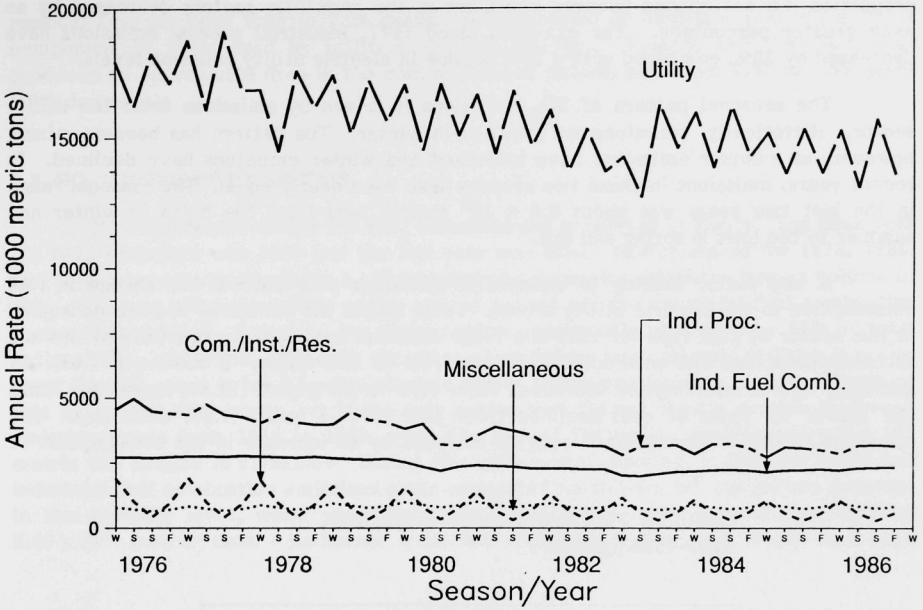

FIGURE 3 National SO_2 Emissions by Sector, 1976-1986

TABLE 1 Sectoral Shares of SO_2 Emissions, 1977, 1980, and 1986 (%)

Sector	1977	1980	1986
Electric utilities	66.2	67.6	67.6
Industrial fuel combustion	10.4	10.0	10.8
Commercial, institutional, and residential fuel combustion	4.0	3.7	3.0
Industrial processes	16.6	15.0	14.6
Miscellaneous	2.8	3.8	4.0
Total	100.0	100.0	100.0

proportion did not change because emissions in the nonutility sectors decreased by an even greater percentage. For example, since 1977, industrial process emissions have decreased by 30%, compared with a 19% decline in electric utility emission levels.

The seasonal pattern of SO_2 emissions is driven by emissions from the utility sector. Historically, emissions are greatest in winter. The pattern has become mixed, however, as summer emissions have increased and winter emissions have declined. In recent years, emissions in these two seasons have been nearly equal. The seasonal range in the last two years was about 0.6×10^6 metric tons from the highs in winter and summer to the lows in spring and fall.

A key factor leading to changes in emissions over time is the change in fuel consumption in the electric utility sector. Table 2 lists the estimates of fuels consumed in this sector by fuel type for 1985 and 1986. National coal consumption (bituminous and subbituminous coal and anthracite) fell from 14.0 to 13.6 quads,* a decline of 2.6%. In addition, lignite consumption increased from 0.78 to 0.87 quad (11.8% increase). Thus the use of all types of coal declined from 14.8 to 14.5 quads (1.9% decrease). The reduction in coal consumption is roughly matched by an increase in the consumption of

TABLE 2 Fuel Consumption by Utilities, 1985-1986 (quads)

Fuel Type	National Consumption 1985	National Consumption 1986	Change, 1985 to 1986
Coal	14.0	13.6	-0.37
Distillate fuel oil (#2)	0.07	0.07	-0
Residual fuel oil (#6)	0.93	1.29	0.36
Lignite	0.78	0.87	0.09
Natural gas	2.97	2.52	-0.45
Total	18.75	18.35	-0.40

Note: Totals may not equal sum of components because of independent rounding.

*1 quad = 10^{15} Btu.

residual fuel oil from 0.93 to 1.29 quads. (Consumption of distillate fuel oil, a minor component of fuels used by utilities, did not change.) Finally, the 1985-86 period produced an appreciable drop in the consumption of natural gas, from 2.97 to 2.52 quads (15% decrease).

2.3 NO_x EMISSIONS BY SECTOR

National sector trends for NO_x emissions are presented in Fig. 4. The peak year for NO_x emissions was 1978 and the low year was 1983. Sector shares for 1978, 1980, and 1986 are presented in Table 3. The transportation sector emits the largest volume of NO_x emissions, with the utility sector ranked second and the industrial fuel combustion sector ranked third. Together, the three sectors consistently produce over 80% of total national NO_x emissions. Although the share of emissions from electric utilities is not as large for NO_x as it is for SO_2, the electric utility sector continues to play an important role in overall NO_x levels. It is the only sector that did not show a decline in overall emission levels from 1978 to 1983, when the rest of the nation experienced a 2×10^6 metric ton decline in emissions. During this same period, declines in transportation and industrial fuel combustion emissions alone accounted for a 1.8×10^6 metric ton decrease in the national level, while emissions from the electric utility sector increased by 0.46×10^6 metric tons. Emissions from the transportation sector, which had been

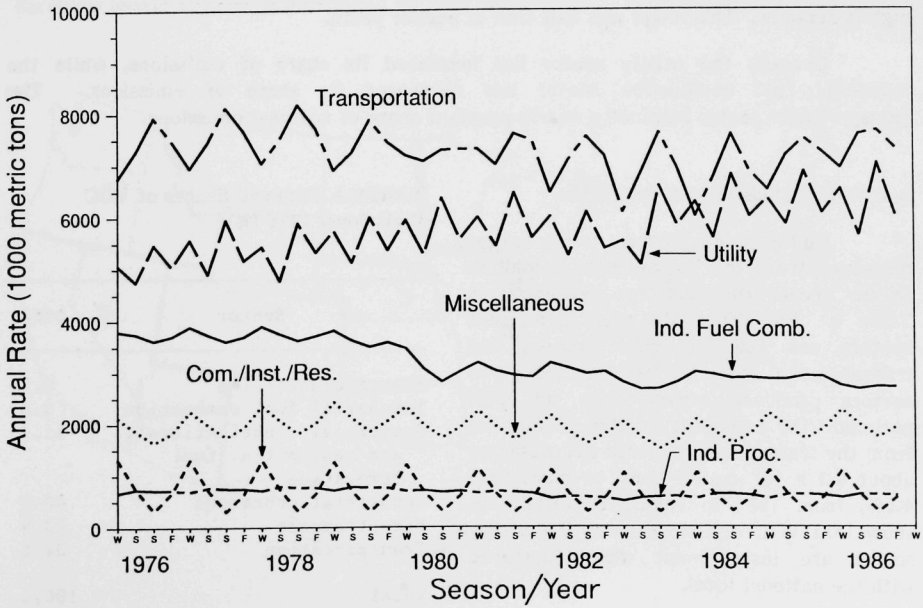

FIGURE 4 National NO_x Emissions by Sector, 1976-1986

TABLE 3 Sectoral Shares of NO_x Emissions, 1978, 1980, and 1986 (%)

Sector	1978	1980	1986
Electric utilities	26.4	29.9	32.0
Industrial fuel combustion	18.4	15.7	13.7
Commercial, institutional, and residential fuel combustion	3.7	3.5	3.3
Industrial processes	3.7	3.5	3.1
Miscellaneous	10.2	10.1	10.1
Transportation	37.5	37.2	37.8
Total	100.0	100.0	100.0

declining since 1978, rose somewhat in 1985 and 1986. Since 1984, emission estimates from this sector have increased by 0.6 x 10^6 metric tons, or 8.8%. In 1986, transportation emissions reached their highest levels since 1978. In addition, the seasonal variation for transportation declined significantly in 1985 and 1986. In these years, the seasonal range was about 2 x 10^6 metric tons from the low in winter to the high in summer. This range was half that of earlier years.

Overall, the utility sector has increased its share of emissions, while the industrial fuel combustion sector has decreased its share of emissions. The transportation sector retained a nearly constant share of national emissions.

2.4 VOC EMISSIONS BY SECTOR

No long-term sectoral trends can be discerned from the limited data available. Sector shares for 1986 are presented in Table 4. For VOCs, the most significant sectors are the industrial process and transportation sectors. Together these two sectors produced almost 74% of total national VOC emissions in 1986. Emissions from the transportation sector decreased by about 0.3 x 10^6 metric tons, or more than 4.5%, from 1985 to 1986. Sector shares show that VOC emissions from the utility sector are insignificant when compared with the national total.

TABLE 4 Sectoral Shares of VOC Emissions, 1986 (%)

Sector	1986
Electric utilities	0.2
Industrial fuel combustion	0.6
Commercial, institutional, and residential fuel combustion	11.7
Industrial processes	40.9
Miscellaneous	13.9
Transportation	32.8
Total	100.0

3 REGIONAL AND SEASONAL EMISSION TRENDS

Monthly estimates of SO_2, NO_x, and VOC emissions in each of the 48 contiguous states for 1985 and 1986 are presented in App. A. These data can be examined in many ways. We chose to aggregate the states into regions and the months into seasons. This section discusses regional and seasonal trends in emission levels. A regional analysis may differ from a national analysis because regions differ widely in the factors that determine the overall level of emissions for the area. To examine regional emissions, it becomes necessary to have a detailed data base that accounts for regional differences in the significant factors. Degree of local industrial development, kinds of industry, transportation patterns, and residential energy consumption characteristics are just a few of these factors. For example, fossil fuel electric utility plants are not spread evenly throughout the country; they are concentrated in the Northeast, the Ohio River Valley, and the Great Lakes region. In addition, differences in regional climates play a significant role in the emissions pattern.

For this analysis, the nation has been organized into three regions: the Northeast, the Southeast, and the West. Federal regions 1, 2, 3, and 5 make up the Northeast, and federal region 4 constitutes the Southeast. The remaining federal regions (6 through 10) make up the West. These regions are depicted in Fig. 5.

The graphs in Sec. 3 present seasonal emissions at an annual rate (i.e., seasonal emission levels have been multiplied by four to correspond to annual rates). In addition,

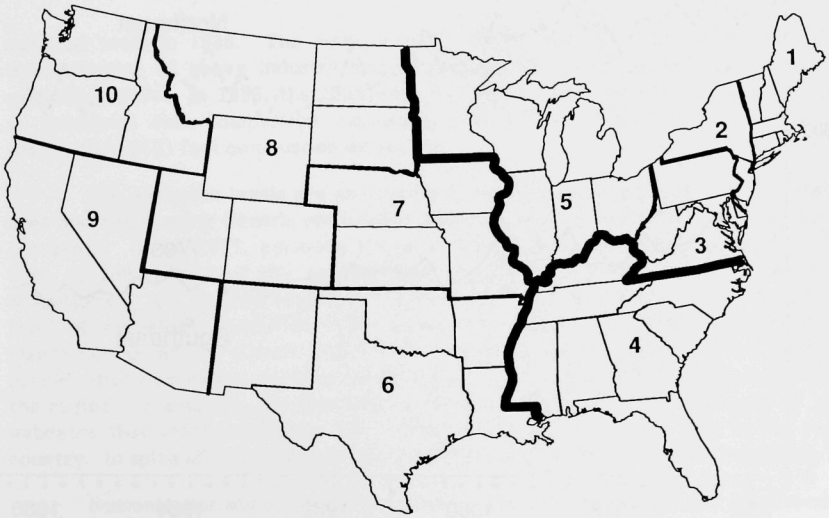

FIGURE 5 Federal Regions as Aggregated for This Study

graphs of VOC emissions are not presented because of to the short time span of the series. For the interested reader, the data for VOCs discussed in the text can be found in App. D.

For the reader's convenience, additional data are presented in Apps. B through D. Appendix B contains graphs of seasonal emissions of the pollutants. (Note: these seasonal graphs use a different seasonal definition for winter than Ref. 1. Winter of the current year includes December of the previous year, rather than the same year, as before.) Appendix C presents the seasonal data used to generate the graphs in App. B. The new seasonal definition is clearly noted. Appendix D contains tables of SO_2 and NO_x emissions for 1976 through 1986 by season and sector for the Northeast, Southeast, and West; it also contains tables of VOC emissions for 1985 and 1986 by season and sector for these three regions.

3.1 NORTHEAST

3.1.1 SO_2 Emissions

Seasonal SO_2 emission trends in the Northeast, Southeast, and West are presented in Fig. 6. Sectoral SO_2 emission trends for the Northeast are presented in Fig. 7. The Northeast contributed the largest share of SO_2 emissions, over 51%, to the

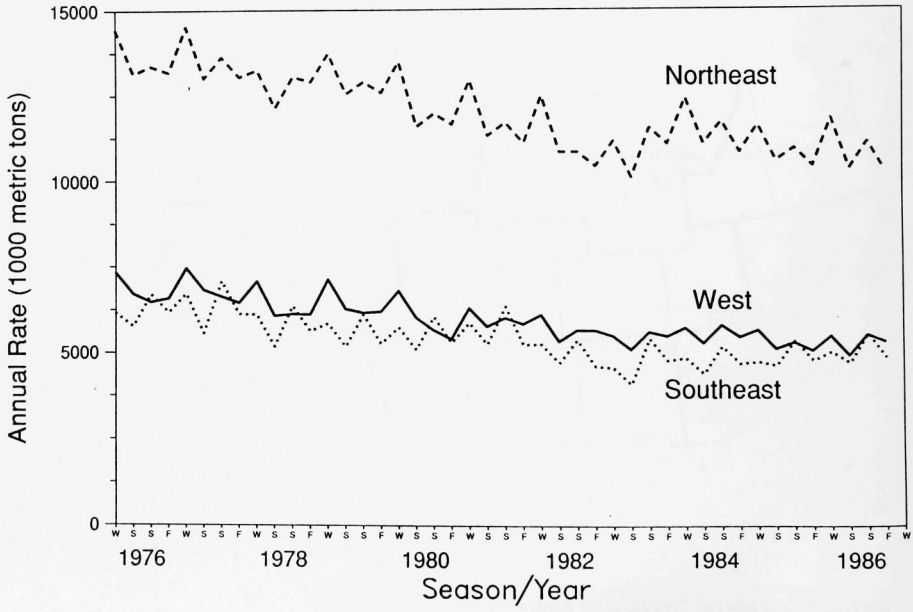

FIGURE 6 Seasonal SO_2 Emissions in the Northeast, Southeast, and West, 1976-1986

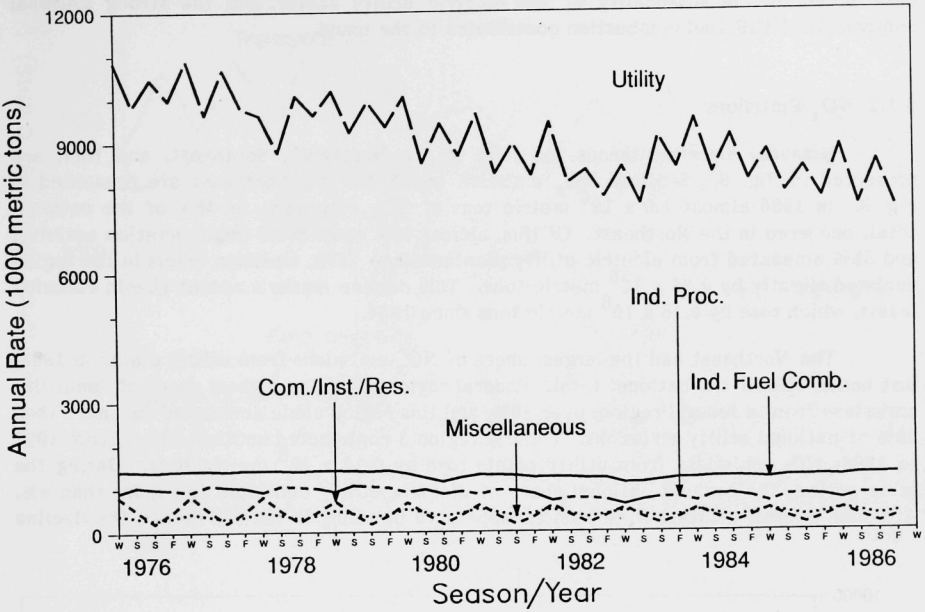

FIGURE 7 Sectoral SO_2 Emissions in the Northeast, 1976-1986

national total in 1986. The many electric utility plants in the region, as well as the concentration of heavy industry and large population centers, contributed to its large emissions share. In 1986, the Northeast had 56% of the electric utility emissions, 56% of industrial fuel combustion emissions, and 51% of commercial, institutional, and residential (CIR) fuel combustion emissions.

SO_2 emission levels are an important issue in the Northeast because parts of this area and neighboring Canada are environmentally sensitive to acid rain, of which SO_2 is a precursor. Since 1977, emission levels in the Northeast declined by 2.7×10^6 metric tons, or 20%. Much of this decline came from federal region 5, which had the largest reductions of any federal region in the country. Particular concern centers around the level of emissions from electricity generating plants. In 1986 emissions from these plants accounted for almost 74% of the regional SO_2 emissions. Over the 1977-1986 period, utility emissions declined by 2.2×10^6 metric tons, or 74% of the total decline for the region. In addition, the Northeast's share of utility emissions declined by 2%, which indicates that utility emissions are falling faster in this region than in the rest of the country. In spite of these improvements, total emission levels remain relatively high.

Seasonal variations for SO_2 emissions are the largest in the Northeast, with a seasonal variability range of about 0.4×10^6 metric tons from the low in fall to the seasonal peak in winter. The seasonality of the emissions for this region is largely

determined by the seasonality of the electric utility sector, but the strong seasonal component of CIR fuel combustion contributes to the trend.

3.1.2 NO_x Emissions

Seasonal emission trends for NO_x in the Northeast, Southeast, and West are presented in Fig. 8. Sectoral NO_x emission trends for the Northeast are presented in Fig. 9. In 1986 almost 7.6 x 10^6 metric tons of NO_x emissions, or 40% of the national total, occurred in the Northeast. Of this, almost 40% came from transportation activity, and 35% emanated from electric utility plants. Since 1978, emission levels in the region declined slightly by 0.29 x 10^6 metric tons. This decline masks a recent rise in emission levels, which rose by 0.16 x 10^6 metric tons since 1984.

The Northeast had the largest share of NO_x emissions from utility plants in 1986, just under 43% of the national total. Federal region 5 had the highest share of nonutility emissions from a federal region, over 20%, and this region alone accounted for more than 25% of national utility emissions. Federal region 3 contributed another 12%. From 1978 to 1986, NO_x emissions from utility plants rose by 0.14 x 10^6 metric tons. During the same period, the region's national share of electric utility emissions fell more than 4%. Although overall utility NO_x emissions appear to be rising in the Northeast, the decline

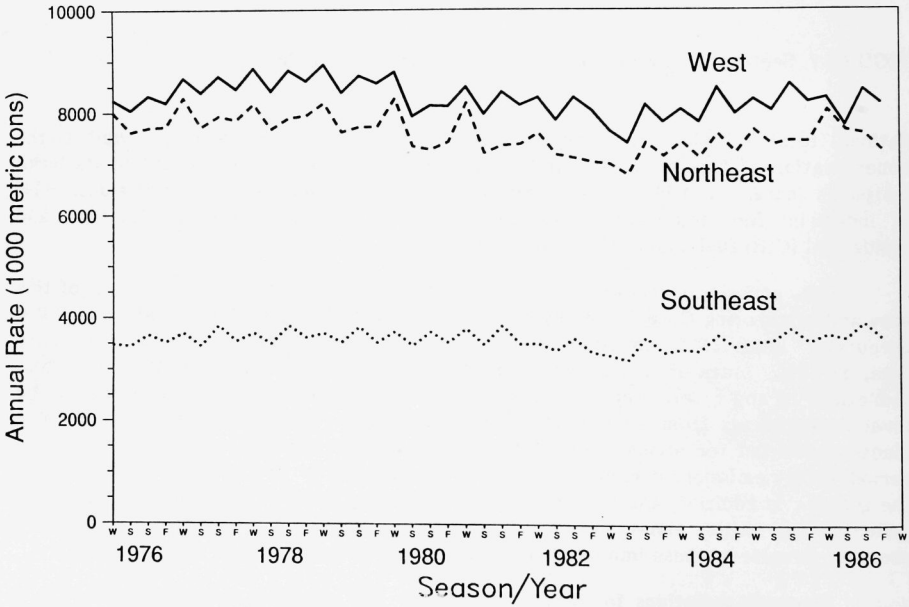

FIGURE 8 Seasonal NO_x Emissions in the Northeast, Southeast, and West, 1976-1986

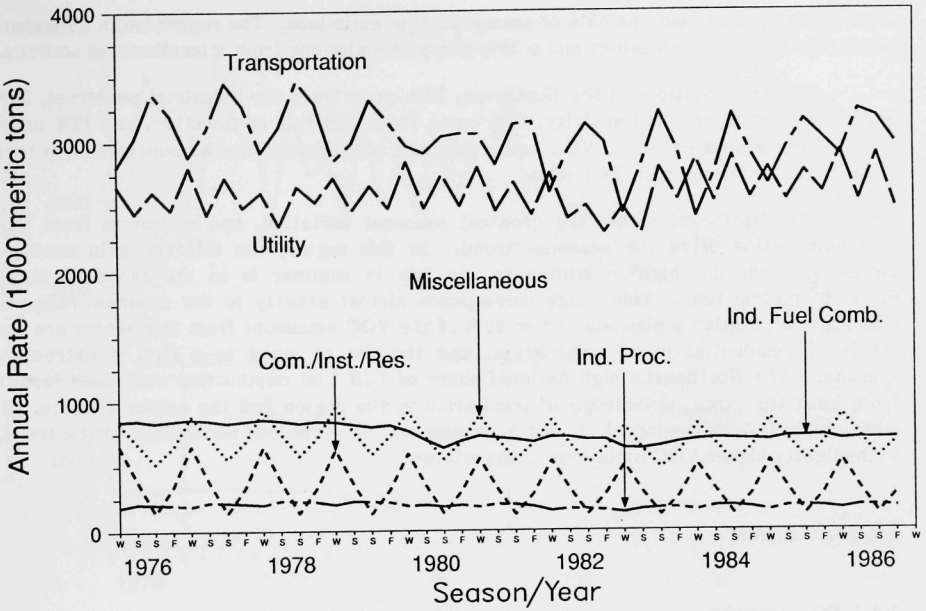

FIGURE 9 Sectoral NO_x Emissions in the Northeast, 1976-1986

in the national share indicates utility emissions are rising faster in other parts of the country.

In 1986, the Northeast had a 42% share of transportation emissions, the largest share in the country. This share is about the same as the region had in 1978, even though emissions from this activity declined 0.28×10^6 metric tons. Transportation emissions were responsible for 40% of the regional total in 1986. Transportation and utility emissions together accounted for 75% of NO_x emissions in the region.

The seasonality of emissions from CIR fuel combustion, miscellaneous sources, and electric utilities is tempered by an opposing seasonal trend for transportation emissions. The result is a seasonal variability range of about 0.2×10^6 metric tons from the peak in winter to the low in spring or fall. For the last two years, the seasonal variations were less pronounced. Federal region 5 has a notable amount of seasonal variation. This region has a range of about 0.08×10^6 metric tons, with a winter peak and a second rise in the summer that is influenced by transportation emission levels.

3.1.3 VOC Emissions

In 1986, 8.9×10^6 metric tons of VOCs were emitted in the Northeast, almost 42% of the national total. Almost 62% of CIR fuel combustion emissions in 1986 came

from this region, as well as 45% of transportation emissions. The region had a 38% share of industrial process emissions and a 36% share of emissions from miscellaneous sources.

Of VOC emissions in the Northeast, 36% came from the industrial processes, 34% came from transportation activity, 17% came from CIR fuel combustion, and 12% came from miscellaneous sources. VOC emissions from electric utilities amounted to less than 0.2% of total emissions in the region.

The Northeast shows the greatest seasonal variation, and emissions from CIR fuel combustion drive the seasonal trend. In this region, the difference in seasonal emissions from the high in winter to the low in summer is in the range of about 0.6×10^6 metric tons. This range corresponds almost exactly to the seasonal range in CIR fuel combustion emissions. Over 90% of the VOC emissions from this sector are the result of residential wood combustion, and the use of wood as a fuel is extremely seasonal. The Northeast's high national share of CIR fuel combustion emissions results from both the large percentage of population in the region and the colder climate. In addition, in federal regions 1, 2, and 5, transportation emissions contribute to the trend, with slightly higher VOC emissions in the winter.

3.2 SOUTHEAST

3.2.1 SO_2 Emissions

Sectoral emissions trends for SO_2 in the Southeast are presented in Fig. 10. In 1986, 5.0×10^6 metric tons of SO_2 were emitted in the Southeast. This region accounts for a 24% share of the national total, which was about half the share for the Northeast and about the same as in the West. Between 1978 and 1984, regional emission levels declined by 1.0×10^6 metric tons. From 1984 to 1986, emissions increased by 0.25×10^6 metric tons, largely due to a 0.26×10^6 metric ton increase in electric utility emissions. However, since 1977, the region's share of total emissions has remained about the same.

Of regional SO_2 emissions in 1986, over 78%, or about 3.9×10^6 metric tons, came from electric utilities. The next largest sector, industrial fuel combustion, had only a 10% share of the regional total. In spite of the recent increase in emissions from utility plants in the region, their share in the national utility sector total has declined by more than 1% since 1977.

The seasonal variability is driven by the utility sector. The range is about 0.2×10^6 metric tons from the seasonal low in spring to the peak in summer. Emissions also rise in the winter.

3.2.2 NO_x Emissions

Sectoral emission trends for NO_x in the Southeast are presented in Fig. 11. In 1986, 3.70×10^6 metric tons of NO_x were emitted in the Southeast. The region had the smallest share of national NO_x emissions, only 19%. Electric utilities in this region

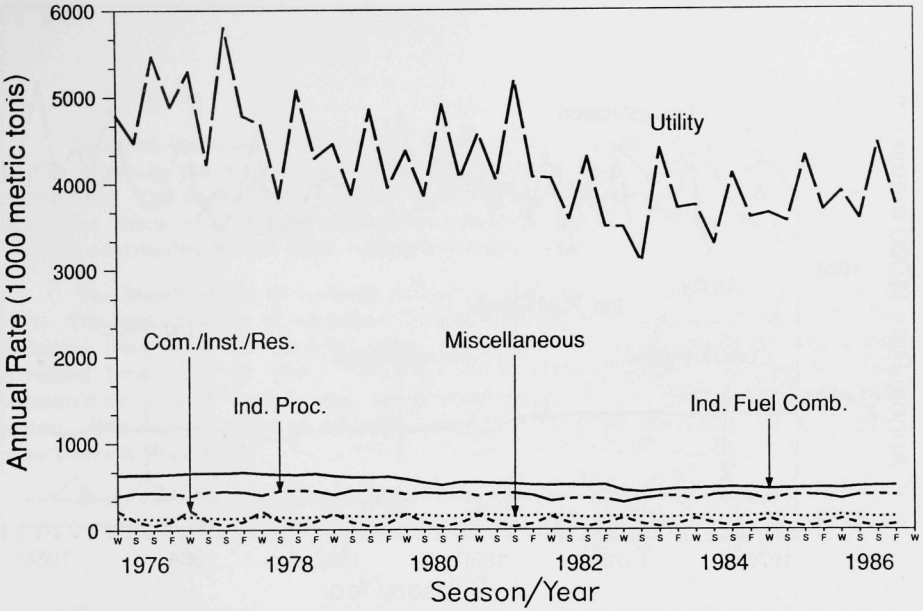

FIGURE 10 Sectoral SO_2 Emissions in the Southeast, 1976-1986

accounted for 23% of total utility emissions, and transportation activity in the Southeast contributed 18% to national transportation emission.

From 1978 to 1983, regional NO_x emissions declined by almost 0.31×10^6 metric tons and then, from 1983 to 1986, rose by more than 0.35×10^6 metric tons. The result was a slight increase in the regional emission levels. Despite this increase, the regional share of NO_x emissions remained constant from 1978 to 1986.

Electric utilities contributed 40% of regional NO_x emissions in the Southeast in 1986. The electric utility sector is the only sector that did not have a net decline in emissions from 1978 to 1986; during this period, emissions from utility plants increased by more than 0.22×10^6 metric tons. Since 1983, the increase in regional emission levels was brought about by rising emission levels in every sector except CIR fuel combustion. The largest increase occurred in the electric utility sector and amounted to 0.19×10^6 metric tons. The next largest rise, 0.10×10^6 metric tons, occurred in the transportation sector. Increased emissions from utility plants accounted for 54% of the total rise in regional emission levels from 1983.

The seasonal variability of NO_x emissions in the Southeast is largely driven by the electric utility sector. Utility emissions in this region peak in summer, simultaneously with the summer peak in emissions from transportation. Together, these

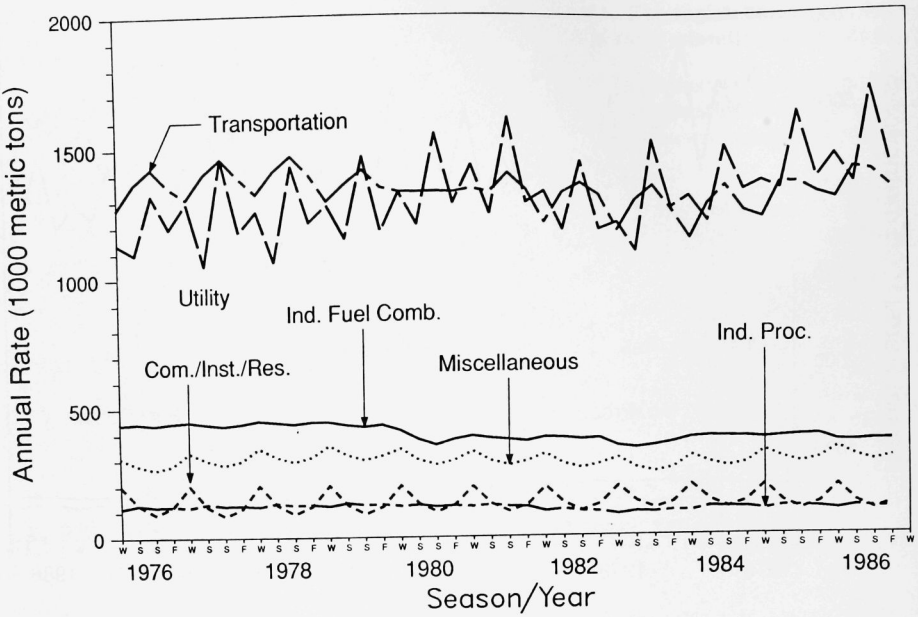

FIGURE 11 Sectoral NO_x Emissions in the Southeast, 1976-1986

two sectors give rise to a summer high. The CIR fuel combustion and miscellaneous sectors peak in the winter, causing a smaller rise in winter. The seasonal variability range of NO_x emissions is about 0.08×10^6 metric tons from the low in fall to the peak in summer.

3.2.3 VOC Emissions

VOC emissions in 1986 came to 4.2×10^6 metric tons in the Southeast, which was a 20% share of national emissions. The region had similar shares of total emissions from the industrial process and transportation sectors.

Of the emissions occurring in the region, 45% came from the industrial process sector and 31% came from the transportation sector. These two sectors contributed 1.9 and 1.3×10^6 metric tons, respectively, to regional emissions. Electric utility VOC emissions were insignificant, less than 0.2% of the regional total.

Because sectoral trends conflict, the seasonal variation in the Southeast is not pronounced. Emissions in most sectors rise in the summer and fall in the winter but are offset by the trend from the CIR fuel combustion sector. The resulting seasonal variability range is a little over 0.1×10^6 metric tons from the high in winter to the low in summer.

3.3 WEST

3.3.1 SO_2 Emissions

Sectoral emission trends for SO_2 in the West are presented in Fig. 12. In 1986, SO_2 emissions in the West accounted for 25% of the national total, or about 5.3×10^6 metric tons. This region had the largest share of industrial process emissions (62%) and a significant share of CIR fuel combustion emissions (38%). Federal regions 6 and 9 together contributed 46% of total industrial process emissions.

The West's share of national emissions remained about the same as it was in 1977. The region's share of emissions from electric utility plants has increased by 3%. Emissions from both the electric utility sector and the miscellaneous sources sector increased from 1977 to 1986. Over the same period, industrial process emissions decreased by 1.1×10^6 metric tons, which compensated for the rise in emissions in other sectors. The regional share of industrial process emissions of the national total dropped more than 6% since 1977.

From 1977 to 1986, federal region 6 was one of only two federal regions to have a net increase in emission levels (the other being federal region 1). In both of these

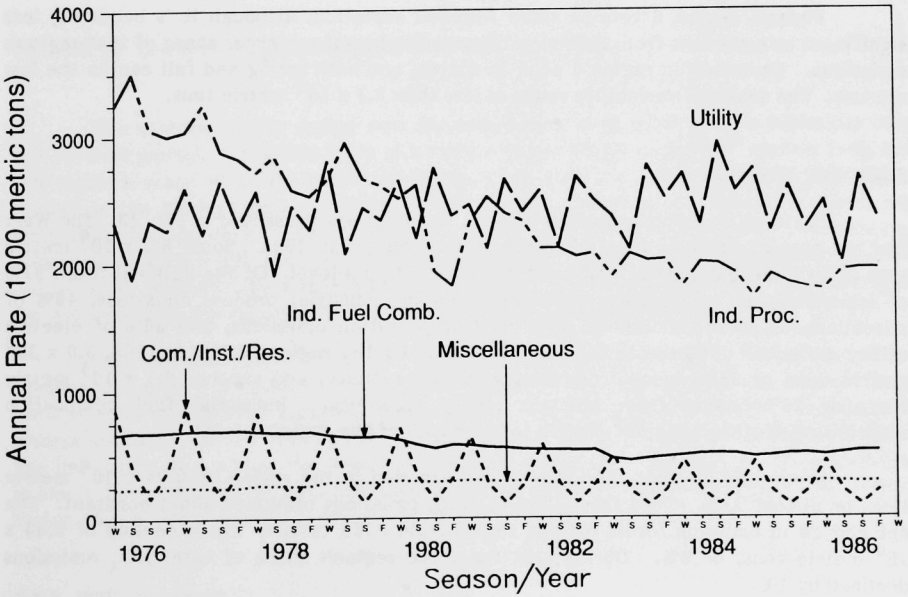

FIGURE 12 Sectoral SO_2 Emissions in the West, 1976-1986

regions, the rise was caused by increasing emissions from electric utilities. Since 1977, SO_2 emissions from utilities in federal region 6 increased by 0.37×10^6 metric tons, or 211%. This increase is equivalent to an average annual growth rate of over 8.6%. At the same time, emissions from industrial processes fell by 1.3×10^6 metric tons, or 15%. As a result of these changes, the electric utility sector's share of emissions in region 6 increased from 17% to 37%, while the industrial process sector's share of emissions fell from 45% to 39%.

In federal region 9, emissions declined by 0.92×10^6 metric tons, or 48%, between 1977 and 1986. Other federal regions had larger absolute declines, but this represents the largest percentage decline for a federal region. The decline resulted from a reduction in emissions in the largest sector, industrial processes. Emissions in this sector declined by 0.76×10^6 metric tons, or 52%, since 1977. The electric utility and the industrial fuel combustion sectors both fell by 44%. The relative shares of sectoral emissions remained about the same, with industrial processes contributing about 71% and electric utilities contributing about 14% of the federal region total.

The seasonal trend for SO_2 emissions in the West as a whole is almost overshadowed because of conflicting trends in the various sectors. Emissions from electric utilities play a much smaller role than in the Northeast or the Southeast. Instead, emissions from industrial processes and CIR fuel combustion have more influence on the seasonal trend, and the result is mixed. At most, the seasonal variability range is 0.2×10^6 metric tons, and summer seems to have more emissions than the other seasons.

Federal region 6 retains some seasonal variation, although it is becoming less significant as emissions from electric utility plants become a larger share of that region's emissions. Emissions in region 6 peak in winter, and both spring and fall can be the low seasons. The seasonal variability range is less than 0.1×10^6 metric tons.

3.3.2 NO_x Emissions

Sectoral emission trends for NO_x in the West are presented in Fig. 13. The West had the highest share of NO_x emissions in the country in 1986. Some 8.2×10^6 metric tons of NO_x were emitted, a 42% share of the national level. Of the national total, 61% of industrial fuel combustion emissions, 55% of industrial process emissions, 49% of miscellaneous source emissions, 40% of transportation emissions, and 34% of electric utility emissions occurred in the West in 1986. Of the regional total in 1986, 3.0×10^6 metric tons, or 36%, came from transportation activity, and another 2.1×10^6 metric tons, or 26%, came from electric utility emissions. Industrial fuel combustion contributed another 1.6×10^6 metric tons, or 20% of the regional total.

From 1978 to 1983, emission levels declined in the region by 0.94×10^6 metric tons, or almost 11%. Then from 1983 to 1986, emissions remained about constant. The net change in emission levels for the region from 1978 to 1986 was a decline of 0.50×10^6 metric tons, or 6%. During this time, the region's share of total NO_x emissions declined by 1%.

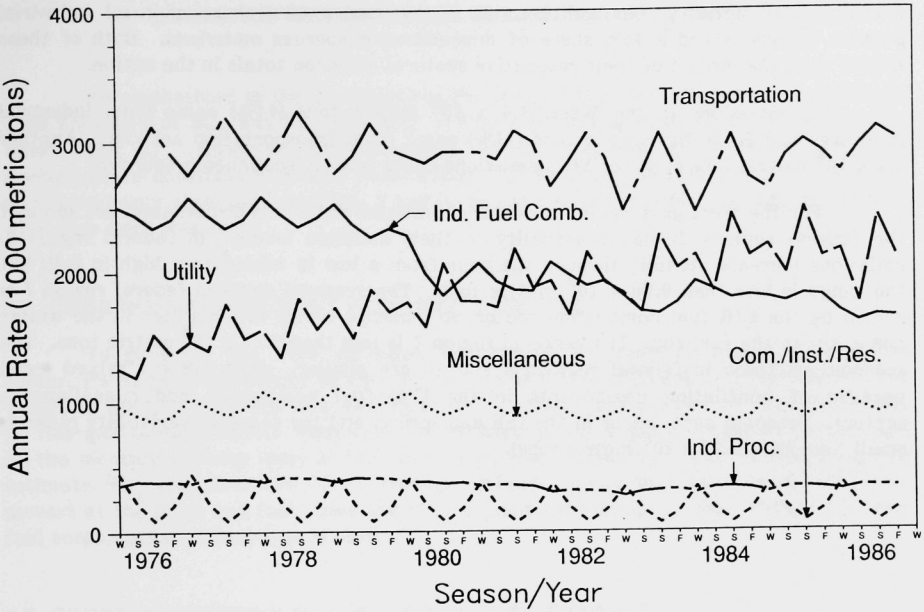

FIGURE 13 Sectoral NO_x Emissions in the West, 1976-1986

The electric utility sector was the only sector with a net gain in emissions over the 1978-86 period. Emissions from this sector increased by 0.53 x 10^6 metric tons, and this region's share of utility emissions increased by over 4%. All but one of the federal regions in the West experienced gains in utility NO_x emissions, and federal region 6 was responsible for the largest share, over 65%, of the increase. This increase was offset by a decline of 0.82 x 10^6 metric tons from industrial fuel combustion emissions. Of the reduction in industrial fuel combustion emissions, 79% occurred in federal region 6, so the net change in the region was a decline of 0.41 x 10^6 metric tons, or 10%.

The seasonal trend for NO_x in this region is mixed, with highs in the winter and summer and a low in spring. The trend is mixed because the region has several large sectors with conflicting seasonal components. In addition, the region encompasses diverse climates, so the climatological impacts can vary widely throughout the region. For the region as a whole, the seasonal variability range from the high to the low seasons is about 1.5 x 10^6 metric tons and appears to be smaller in recent years. In no federal region does a large seasonal pattern emerge from the conflicting trends.

3.3.3 VOC Emissions

Over 37% of national VOC emissions, or almost 7.8 x 10^6 metric tons, were emitted in the West in 1986. This region had a 36% share of national emissions from

transportation activity. In addition, the region had a 40% share of total industrial process emissions and a 45% share of miscellaneous sources emissions. Both of these shares were the largest of their respective sectoral emission totals in the nation.

Of emissions in the West, 3.4×10^6 metric tons (44%) came from industrial processes and 2.4×10^6 metric tons (31%) came from transportation activity. Another 1.3×10^6 metric tons (17%) of VOC emissions came from miscellaneous sources.

For the West as a whole, no seasonal emission pattern is discernable, but some of the federal regions display seasonality in their emission levels. In federal region 6, emissions increase steadily through the year from a low in winter to a high in fall, but the range is less than 0.05×10^6 metric tons. The seasonal cycle in federal region 7 is driven by the CIR fuel combustion sector, so emission levels reach a high in the winter and a low in the summer. The range in region 7 is less than 0.05×10^6 metric tons. The seasonal patterns in federal regions 8 and 10 are similar. Both show a mixed trend because of conflicting components in the CIR fuel combustion and miscellaneous sectors. Seasonal highs occur in the fall and spring, and the seasonal variability range is small (less than 0.03×10^6 metric tons).

4 ESTIMATION METHODOLOGY FOR SO_2 AND NO_X EMISSIONS

As emphasized in the introduction, the methodology for estimating the 1985 and 1986 emissions of SO_2 and NO_x was kept as close as possible to that used in the previous work, Ref. 1. However, some changes to the methodology were necessary to accommodate constraints in data availability. For example, sectoral control totals that were previously obtained from Ref. 2 had to be estimated for 1985 and 1986 at the time when this work was done.

4.1 CURRENT METHODOLOGY FOR UTILITY SECTOR

To generate the 1985 estimates of monthly emissions in the electric utility sector, the same methodology as used in Ref. 1 was followed (see Ref. 1 for details). The variables used to estimate SO_2 emissions are (1) the sulfur content of fuel deliveries, (2) flue-gas desulfurization capacity and efficiency, (3) a plant emission factor, and (4) the monthly activity level at the plant (e.g., coal consumed). The variables used to estimate NO_x emissions are (1) an average emission factor that depends on the prime movers at the plant and fuel types and (2) the plant activity level. For VOCs, only plant fuel consumption by fuel type is used.

4.2 CURRENT METHODOLOGY FOR NONUTILITY SECTORS

This section discusses the SO_2 and NO_x emission estimation methodology that was used in the previous report. Although that earlier work was limited to SO_2 and NO_x emissions, this report expands the scope to include VOCs. The VOC methodology is discussed in Sec. 5.

Table 5 shows the sources of data for the SO_2 estimates, and Table 6 shows the sources of data for the NO_x estimates.[1,3-5] In addition to listing the various information sources used for the updated estimates, the tables visually depict the methodology. Each row corresponds to a single national-level emissions sector. The similarity in the approach for estimating SO_2 and NO_x emissions can be seen by comparing Tables 5 and 6.

The categories in the first column refer to the emission sectors defined in Ref. 1 by which all nonutility emissions are classified at the national level. The sum of emissions from these categories equals total nonutility emissions for a given year. In the earlier work, these sector emissions totals came directly from Ref. 2, but for 1985 and 1986, these national emission totals were estimated. Our method for estimating 1985 and 1986 sector totals is described in Sec. 5.3.

The categories in the second column represent certain groupings of source classification codes (SCCs) from the 1980 NAPAP emissions inventory. Each SCC represents a source of emissions and can be either (1) a point source, such as a piece of equipment or a factory, or (2) an area source such as transportation or residential fuel consumption. The NAPAP emissions inventory provides state-specific information for

TABLE 5 Sources of SO_2 Emissions and Related Activity Data[a]

National Emissions Data: Sector Category in TM-318	State-Level Emission Data: Source Categories from 1980 NAPAP[b]	Monthly Activity Data Used for Monthly Shares	Annual Growth Indices for 1985, 1986
Industrial Coal Combustion	Industrial Coal Combustion	Coal Weighted Industrial Index[c]	MER-Industrial Coal Consumption
Industrial Fuel Oil Combustion	Industrial Residual and Distillate Oil Combustion	Oil Weighted Industrial Index[c]	MER-Residual and Distillate Oil Supplied[d]
Total of Industrial Natural Gas, Wood, and Other Fuels Combustion	Industrial Natural and Process Gas, Coke, and Misc. Fuels Combustion	Weighted Industrial Index[c]	MER-Industrial Coke and Natural Gas Consumption[c]
Residential and Commercial Coal Combustion	Residential, Commercial, and Institutional Coal Combustion	1982 Quarterly Coal Report	MER-Residential and Commercial Coal Consumption
Residential and Commercial Fuel Oil Combustion	Residential, Commercial, and Institutional Oil Combustion	Heating Degree-Days	MER-Residual and Distillate Oil Supplied
Residential and Commercial Natural Gas, Wood, and Other Fuels Combustion	Residential, Commercial, and Institutional Other Fuels Combustion	Heating Degree-Days	MER-Residential and Commercial Natural Gas Consumption
Sulfuric Acid	Inorganic Chemicals Sulfuric Acid and Elemental Sulfur Synthetic Materials Chemical Products Basic or Organic Chemicals Agricultural Chemicals	SCB-Aluminum Sulfate Production, Commercial SCB-Sulfur, Ammonium Sulfate, and Sulfuric Acid Production FRB-Chemicals and Related Products FRB-Chemicals and Related Products FRB-Chemicals and Related Products SCB-Sulfur, Ammonium Sulfate, and Sulfuric Acid Production	SCB-Aluminum Sulfate Production, Commercial SCB-Mean of Sulfur, Ammonium Sulfate, and Sulfuric Acid Production SCB-Phenolic Resins FRB-Chemicals and Related Products FRB-Chemicals and Related Products SCB-Mean of Sulfur, Ammonium Sulfate, and Sulfuric Acid Production
Iron and Steel and Carbon Black	Basic Steel and Mill	SCB-Raw Steel Production	SCB-Raw Steel Production

TABLE 5 (Cont'd)

National Emissions Data: Sector Category in TM-318	State-Level Emission Data: Source Categories from 1980 NAPAP[b]	Monthly Activity Data Used for Monthly Shares	Annual Growth Indices for 1985, 1986
Primary Copper	Primary Copper	SCB-Primary Copper Production	SCB-Primary Copper Productions
Primary Aluminum	Primary Aluminum	SCB-Primary Aluminum Production	SCB-Primary Aluminum Production
Primary Lead and Zinc	Primary Nonferrous Metals	FRB-Primary Nonferrous Metals	FRB-Primary Nonferrous Metals
Secondary Lead	Secondary Nonferrous Metals	SCB-Lead, Secondary, Recovered as Refined	SCB-Lead, Secondary, Recovered as Refined
Glass	Glass	SCB-Glass Containers Production	SCB-Glass Containers Production
Cement	Cement and Related	SCB-Portland Cement, Shipments, Finished	SCB-Portland Cement, Shipments, Finished
Lime	Concrete and Miscellaneous Clay	SCB-Clay Construction Products, Brick, Unglazed	SCB-Clay Construction Products, Shipments, Brick, Unglazed
Petroleum Refining	Petroleum Refining and Asphalt	FRB-Petroleum Products	FRB-Petroleum Products
Pulp Mills	Pulp and Paper	SCB-Wood Pulp, Total All Grades	SCB-Wood Pulp, Total All Grades
Natural Gas Production	Oil and Gas Extraction	SCB-Crude Petroleum Production SCB-Natural Gas Production	SCB-Total Production of Crude Petroleum and Natural Gas
Miscellaneous	Commercial/Institutional	Heating Degree-Days	MER-Residential Energy Consumption

[a]Source documents are abbreviated as follows: TM-318 = Ref. 1, SCB = Ref. 3, MER = Ref. 4, and FRB = Ref. 5.

[b]For a list of the specific SCCs used for each sector, refer to Ref. 1.

[c]See text for methodology to compute fuel weighted industrial indices by state.

[d]Weighted average growth rate using emission weights from NAPAP.

TABLE 6 Sources of NO_x Emissions and Related Activity Data[a]

National Emissions Data: Sector Category in TM-318	State-Level Emission Data: Source Categories from 1980 NAPAP[b]	Monthly Activity Data Used for Monthly Shares	Annual Growth Indices for 1985, 1986
Industrial Coal Combustion	Industrial Coal Combustion	Coal Weighted Industrial Index[c]	MER-Industrial Coal Consumption
Industrial Fuel Oil Combustion	Industrial Residual and Distillate Oil Combustion	Oil Weighted Industrial Index[c]	MER-Residual and Distillate Oil Supplied[d]
Industrial Natural Gas Combustion	Industrial Natural and Process Gas Combustion	Weighted Industrial Index[c]	MER-Industrial Natural Gas and Misc.[d]
Industrial Wood/Other Combustion	Industrial Wood and Misc. Fuels Combustion	Uniform Distribution	MER-Industrial Natural Gas and Misc.[d]
Residential, Institutional, and Commercial Coal Combustion	Residential, Commercial, and Institutional Coal Combustion	1982 Quarterly Coal Report	MER-Residential and Commercial Coal Consumption
Residential, Institutional, and Commercial Fuel Oil Combustion	Residential, Commercial, and Institutional Fuel Oil Combustion	Heating Degree-Days	MER-Residential and Distillate Oil Supplied
Residential, Institutional, and Commercial Natural Gas Combustion	Residential, Commercial, and Institutional Area Natural Gas Combustion	Heating Degree-Days	MER-Residential and Commercial Natural Gas Supplied
Wood/Other	Misc. Fuels	Uniform Distribution	Kept at 1984 Level
Organic Chemicals	Industrial Chemicals Synthetic Materials (several subgroups)	SCB-Aluminum Sulfate SCB-Sulfur, Ammon. Sul., Sulf. Acid SCB-Phenolic Resins SCB-Chem. and Prod. Index	SCB-Aluminum Sulfate SCB-Sulfur, Ammon. Sul., Sulf. Acid SCB-Phenolic Resins SCB-Chem. and Prod. Index

TABLE 6 (Cont'd)

National Emissions Data: Sector Category in TM-318	State-Level Emission Data: Source Categories from 1980 NAPAP[b]	Monthly Activity Data Used for Monthly Shares	Annual Growth Indices for 1985, 1986
Ammonia Nitric Acid	Agricultural Chemicals (three subgroups)	SCB-Ammonia SCB-Ammonium Nitrate SCB-Nitric Acid	SCB-Ammonia SCB-Ammonium Nitrate SCB-Nitric Acid
Iron and Steel	Basic Steel and Mill	SCB-Raw Steel Production	SCB-Raw Steel Production
Glass	Glass	SCB-Glass Containers	SCB-Glass Containers
Cement	Cement and Related	SCB-Portland Cement	SCB-Portland Cement
Lime	Concrete and Clay	SCB-Clay Products, Brick	SCB-Clay Products, Brick
Petroleum Refining	Petroleum Refining and Asphalt	SCB-Petroleum Products	SCB-Petroleum Products
Pulp Mills	Pulp and Paper	SCB-Wood Pulp Production	SCB-Wood Pulp Production
Solid Waste Disposal	Solid Waste Disposal	Uniform Distribution	Kept at 1984 Level
Area Transport	Air, Rail, and Misc. Area Transport	Uniform Distribution	FRB-Av. Fuel and Kerosene
Gasoline Vehicles	Gasoline Vehicles	DOT Monthly Gasoline Use	MER-Motor Gasoline Supplied
Diesel Vehicles	Diesel Vehicles	DOT Monthly Misc. Fuel Consump.	FRB-Distillate Fuel Oil

[a]Source documents are abbreviated as follows: TM-318 = Ref. 1, SCB = Ref. 3, MER = Ref. 4, and FRB = Ref. 5.

[b]For a list of the specific SCCs used for each sector, refer to Ref. 1.

[c]See text for methodology to compute fuel weighted industrial indices by state.

[d]Weighted average growth rate using emission weights from NAPAP.

emissions in the SCC sectors in 1980. The methodology here uses a state's share of emissions in 1980 to estimate the state's share in other years. The NAPAP emission source categories yield state emission shares from the following relationship:

$$\text{State share } (i,s) = \text{Emissions } (i,s,1980)/\sum_{s} \text{Emissions } (i,s,1980) \quad (1)$$

where:

State share (i,s) = state share of emissions in sector i in state s in 1980, and

Emissions $(i,s,1980)$ = emissions from a grouping of SCCs for the corresponding sector i in state s in 1980.

From the state shares, one can estimate state-level emissions for any given year by multiplying national emissions for the sector for a given year by each state's share of emissions for that particular sector.

$$\text{State emissions } (i,s,y) = \text{Sector emissions } (i,y) \times \text{State share } (i,s) \quad (2)$$

where:

State emissions (i,s,y) = state-level emissions in sector i for state s in year y, and

Sector emissions (i,y) = national emissions in sector i in year y (Col. 1).

The third column in the tables, "Monthly Activity Data," is used to estimate intra-annual variation in activity for the corresponding emissions sector in column 1. For example, the industrial process sectors use production statistics to describe variations in monthly activity. For nonindustrial process categories, other activity indexes were developed.[1] For example, an energy-weighted index of industrial production is used to estimate monthly activity for coal burned in industrial boilers, which falls under the sector label "Industrial Coal Consumption." With these monthly activity variables, we can calculate the monthly share of activity in a particular sector from the following formula:

$$\text{Monthly share } (i,m,y) = \text{Activity } (i,m,y)/\sum_{m} \text{Activity } (i,m,y) \quad (3)$$

where:

Monthly share (i,m,y) = monthly share of activity for sector i in month m of year y, and

Activity (i,m,y) = estimated activity for sector i in month m of year y.

To obtain monthly state-level emission estimates by sector i, the factors of Eqs. 2 and 3 are multiplied:

$$\text{Emissions } (i,s,m,y) = \text{State emissions } (i,s,y) \times \text{Monthly share } (i,m,y) \quad (4)$$

Up to this point, the methodology is the same as that used for the earlier estimates.

4.3 CHANGES FOR UPDATE ESTIMATION METHODOLOGY

In Ref. 1, estimates for the national sector emissions were based on data from Ref. 2, which covers the years 1940-84. For this report, national-level sector emissions for 1985 and 1986 were estimated by means of an "annual extender." This annual extender is an estimate of the annual growth rate in emissions for each sector.

First, the growth rate for activity in a sector was obtained by taking the ratio expressed in the following equation:

$$\text{Activity growth index } (i,y) = \text{Activity } (i,y)/\text{Activity } (i,y-1) \quad (5)$$

where:

Activity growth index (i,y) = estimated growth factor in activity for sector i from year $y-1$ to year y,

Activity (i,y) = estimated activity for sector i in year y, and

Activity $(i,y-1)$ = estimated activity for sector i in the previous year, $y-1$.

In many cases, the index used to estimate annual activity growth was the same as the activity index used to allocate monthly shares. The current year's sector emissions were extrapolated from the previous year's emissions at the national level with the following equation:

$$\text{Sector emissions } (i,y) = \text{Activity growth index } (i,y) \times \text{Sector emissions } (i,y-1) \quad (6)$$

For the update methodology, Eq. 6 was substituted for the sector emissions (i,y) term in Eq. 2 to obtain emission estimates for 1985 and 1986. Except for this, the update methodology is the same as the methodology used in Ref. 1.

4.4 SPECIAL CONSIDERATIONS

The methodology outlined in Secs. 4.2 and 4.3 illustrates the simplest and most frequently used approach. Some sectors, however, are complex and require more than one SCC category and its associated monthly activity index to accurately allocate

emissions. For example, the chemical sector category has five different SCC groupings, each with a corresponding monthly activity index. Each of the five subcategories is weighted according to its percentage of emissions in the sector from the 1980 NAPAP emissions inventory. Subsector emission shares are obtained from the following equation:

$$\text{Subsector share } (j) = \text{Subsector emissions } (j,1980) \div \sum_{j} \text{Subsector emissions } (j,1980) \quad (7)$$

where:

Subsector share (j) = share of sector i emissions in subsector j, and

Subsector emissions $(j,1980)$ = emissions in subsector j in 1980.

Subsector emissions are then obtained from the following formula:

$$\text{Emissions } (j,s,m,y) = \text{Sector emissions } (i,y) \times \text{Subsector share } (j) \times [\text{Emissions } (j,s,1980)/\sum_{s} \text{Emissions } (j,s,1980)] \times [\text{Activity } (j,m,y)/\sum_{m} \text{Activity } (j,m,y)] \quad (8)$$

where:

Emissions (j,s,m,y) = estimated emissions for subsector j in state s in month m of year y, and

Sector emissions (i,y) = estimated sector emissions for sector i in year y (column 1).

Finally, subsector j emissions are summed to get total sector i emissions:

$$\text{Emissions } (i,s,m,y) = \sum_{j} \text{Emissions } (j,s,m,y) \quad (9)$$

This method allows us to allocate individual monthly activity indices to different subsectors and hence to increase the accuracy of the emission estimates.

5 METHODOLOGY FOR VOC ESTIMATION

This section discusses several adaptations to the general methodology that were incorporated in the model we developed to estimate monthly state VOC emissions. (The VOC computer program is an adaptation of the NO_x computer program.) These changes primarily allow us to model in more detail those sectors that are major emitters of VOCs -- transportation and industrial processes. These changes are also part of the ongoing effort to improve the methodology. Other areas targeted for future improvements are outlined in Sec. 7.

5.1 TRANSPORTATION

The most significant methodology changes were developed for the transportation sector. This section describes our changes to the method of estimating monthly emissions of precursor pollutants from transportation sources. The changes account for seasonal variability in both climatological and activity parameters. Moreover, the method acknowledges the importance of emission rate nonlinearity at the lower average operating speeds characteristic of urban roads, over which some 75% of total travel miles take place. Section 5.1.1 focuses on the procedure for estimating monthly activity and emission levels by state for vehicles in highway transportation. Section 5.1.2 presents the process as it is applied to the off-highway transportation source categories covered by the Transportation Energy and Emissions Modeling System (TEEMS).[6]

5.1.1 On-Highway Sources of VOCs

5.1.1.1 Highway Activity

Monthly estimates of travel on U.S. highways are given in the annual publication *Highway Statistics*[7] from the U.S. Department of Transportation (DOT). For each calendar year (the most recent being 1985), a table of vehicle miles of travel (VMT) by state and road type (Table VM-2) is used together with the tables of highway gasoline and special fuels use by state and month (Tables MF-25 and MF-26) to derive a monthly apportioning factor for VMT. These monthly totals may be further allocated by vehicle type by using Table VM-1, which provides annual nationwide estimates of VMT for passenger cars, buses, light trucks, heavy single-unit trucks, and heavy combination (tractor-trailer) trucks. The entire allocation formula may be expressed as:

$$\text{VMT}(j,s,m) = \text{VMT}(s) \times [\text{Gas}(s,m)/\underset{m}{\Sigma}\ \text{Gas}(s,m)] \times [\text{VMT}(j)/\underset{j}{\Sigma}\text{VMT}(j)] \qquad (10)$$

where:

VMT (j,s,m) = vehicle-miles of travel by vehicle type j in state s and month m,

Gas (s,m) = highway gasoline (for gasoline-burning vehicle types) or diesel fuel (if j is a light- or heavy-duty diesel-burning truck or bus) consumed in state s during month m, and

$$\sum_{j} VMT = \sum_{s} VMT.$$

As can be seen, considerable confidence is vested in the assumption of uniformity in the relationship between mileage accrual and fuel consumption; indeed, DOT develops its annual VMT estimates from estimates of fuel consumption by vehicle type. Equation 1 therefore accepts the legitimacy of DOT's computation procedure at the state level and incorporates whatever weather- or temperature-related effects by state are assumed by DOT in developing Tables MF-25 and MF-26 of *Highway Statistics*.

The lag between activity reported by *Highway Statistics* and the availability of that publication is from 10 to 22 months. Therefore, a more current data base is needed for updating monthly highway estimates. That data base resides in the Federal Highway Administration (FHWA) publication *Monthly Motor Fuel Reported by States*,[8] issued 12 times annually, which provides state-level highway gasoline sales at about a four-month lag. This publication does not estimate how much highway gasoline and diesel fuel was actually *consumed* each month, as does *Highway Statistics*. Changes in this parameter can be estimated, however, by calculating the ratios of the most recent year's monthly data and the same data for the corresponding month in the latest available *Highway Statistics*, then multiplying the most recent "empirical" values for VMT (j,s,m) by these respective ratios. We used this procedure to develop 1986 monthly on-highway activity estimates by state. Activity shares and average fuel efficiency by vehicle type were assumed not to change.

5.1.1.2 Emission Factors

Location-specific sets of emission rates for highway activity were developed by computing an emission factor for each monthly average temperature (10-degree increments) in each of three years (1985-87) for each of two operating regimes (urban and rural/intercity) through the U.S. Environmental Protection Agency's (EPA's) MOBILE3 model. For each of three vehicle types (automobile, light-duty gasoline-powered truck, and light-duty diesel-powered truck), therefore, a set of 14 emission factors was given for each year from which to select the speed and temperature regime appropriate to a given state and month. Factors for heavy-duty gasoline- and diesel-powered trucks and buses had been preweighted by speed regime but could be selected according to temperature.

5.1.1.3 Estimation

An algorithm was developed that (1) matched the activity value (VMT) for each state, month, vehicle type, and operating speed (shares of "rural" speeds vary by state) with the corresponding emission factor and (2) maintained a running sum of the individual

products to generate a national highway emissions inventory by pollutant and vehicle type. The results of this computation are presented and discussed in Sec. 7.4.1. Simply, the equation was:

$$\text{Emissions}(j,s,m,y) = \text{VMT}(j,s,m,y) \times \text{Factor}(j,s,m,y) \quad (11)$$

where:

Emissions (j,s,m,y) = emissions from vehicle type j in state s in month m of year y,

VMT (j,s,m,y) = vehicle miles traveled by vehicle type j in state s in month m of year y (from Eq. 10), and

Factor (j,s,m,y) = Emission factor for subsector j in month m of year y. (The emission factors are month-specific to account for average monthly temperature differences in the state and are year-specific to account for changes in fuel efficiency.)

For the base year 1985 estimates, the emissions calculated in Eq. 11 were scaled so that the sum of all emissions for a particular vehicle type j equaled the national control totals found in Table 16 in Ref. 2. Our 1986 estimates were calculated by examining growth rates in the different vehicle-type subsectors, and then totalling to get the national total. As before, each vehicle type total for 1986 is estimated by:

$$\text{Emission}(j,y) = \text{Activity growth index}(j,y) \times \text{Emissions}(j,y\text{-}1) \quad (12)$$

where:

Emission (j,y) = national emission total for vehicle type j in year y,

Activity growth index (j,y) = the ratio of activity for vehicle type j in year y over activity of year y-1, and

Emissions $(j,y\text{-}1)$ = national emission total for vehicle type j in year y-1.

The net effect of these methodology changes is that our estimates do not rely on the 1980 NAPAP emissions inventory for state shares of transportation emissions. Thus, changes within this sector can be accounted for on a monthly basis.

5.1.2 Off-Highway Sources of VOCs

The off-highway transportation source categories considered by the TEEMS are:

- Locomotives (in line-haul and switching operations, respectively),
- Commercial aviation (passenger and dedicated freight),
- General aviation,
- Military aviation,
- Inland and coastal waterway barge operation,
- Great Lakes and coastwise steamship and large diesel motorship operation, and
- Gas pipeline compressor operation.

Monthly state-level allocation procedures in the proposed method are described for each category below. As of this writing, state-level data for computing 1986 emissions are not available. Therefore, because activity by these source categories is relatively stable in the short term, 1986 emissions by source are assumed (on an interim basis) to be equal to those of 1985.

5.1.2.1 Locomotive Operation

The DOE Energy Information Administration (EIA) annually reports sales of special fuels (including distillate and residual fuels) to states by utilization category (most recent year: 1985).[9] One such category is railroads. Although less than 100% of distillate fuel purchased by railroads is used by locomotive operation and, further, much of this fuel is actually consumed by line-haul operations in states other than the state of recorded purchase, allocation of locomotive activity by state is more reliable when based on fuel sales data than on total track mileage because of the large quantity of relatively idle track in many states. Therefore, locomotive emissions (per thousand gallons of fuel burned) were assigned to states on the basis of fuel purchase, with line-haul and switching components apportioned equally to each state on the basis of the 1985 national share from TEEMS' energy demand outputs. The graph of monthly shipment activity data from the journal *Progressive Railroading*[10] was used to divide the annual fuel consumption into 12 components. Peak month for rail hauls (in 1985, with similar results shown for 1984 and 1986) is October, with significant downturns regularly occurring at the year's end, Memorial Day, and July 4 holidays. These effects are incorporated in the state-level activity rates. Emission factors are provided by the EPA publication *AP-42: Compilation of Air Pollutant Emission Factors.*[11] These factors are weighted on the basis of the distribution of locomotive equipment currently in service. Updating these factors with more recent locomotive emissions and utilization data is under consideration.

5.1.2.2 Commercial Aviation

The annual Federal Aviation Agency (FAA) publication *Statistical Handbook of Aviation*[12] reports total civil airport operations as well as commercial aircraft departures (a subset of the foregoing) by state. Because the basis of *AP-42* emission factors for aircraft activity is the full landing/takeoff (LTO) cycle (two operations), arrivals by state are assumed to equal departures and the commercial total given for each state is used directly with the (weighted) emission factor. This total is doubled and then subtracted from the state's civil operations total, however, to derive net general aviation activity (see next subsection).

One additional refinement is needed to compute commercial aviation emissions, because emission factor weighting by aircraft type (i.e., share of population in service) produces different values if wide-body aircraft are included in the mix. Wide-body aircraft generally operate out of major hub airports, which are found in only about 20 states. For these states, an emission factor characteristic of "long-runway"-type operations was applied to the commercial total. As a result, average emissions per LTO cycle differed from those in "nonhub" states.

5.1.2.3 General Aviation

As stated, net state civil airport operations minus commercial aircraft operations is assumed to represent landings and takeoffs by general aviation aircraft. In fact, a share of this total is probably helicopter traffic and Air National Guard aircraft using FAA airports, but this share is sufficiently small to be ignored. The net operations are therefore divided by two (to give the actual LTO total) and multiplied by the weighted *AP-42* factor used in the TEEMS for general aviation aircraft.

Monthly activity allocations are handled identically for commercial and general aviation, with peak travel months (determined by passenger boardings) in August, November, December, July, and June (in approximately descending order). Movements are distributed approximately equally over the remainder of the year.

5.1.2.4 Military Aviation

At present, no reliable data are available for military aircraft operations by state during 1985. Until such data come to hand, state shares from the NAPAP inventory for 1980 are being used, with total national operations assumed to have increased 20% from the 1981 total of 2.5 million. State-level activity is distributed equally over 12 months and multiplied by the TEEMS weighted emission factor for military aircraft derived from *AP-42*.

5.1.2.5 Inland and Coastal Waterway Barges

Barge movements are assumed to be powered almost exclusively by distillate fuel. Therefore, for states located exclusively on inland waterways, 100% of the

distillate fuel sold for vessel bunkering as reported in the 1985 EIA data is assigned to river barge and tow operations and the corresponding *AP-42* factor (emission loading per thousand gallons burned) is used directly, the result being assigned totally to the state of sale, as occurred with locomotive operation. The share of barge activity and resultant distillate consumption in states with both inland waterway and Great Lakes activity, or waterway and coastwise shipping, is determined as an artifact of bunkering of residual and distillate oil for steamship operations and large diesel motorship operations, as described in the following text.

Movements on inland waterways are highly constrained by seasonal river conditions. Thus, state-level activity is most intense in April through October (accounting for over 80% of total movement) and relatively dormant in the deep winter months. In other words, even though many reaches remain ice-free year-round, the shipments that would otherwise originate from northern sections of the waterway network do not move by water.

5.1.2.6 Great Lakes and Coastwise Steamships and Large Diesel Motorships

Steamships and diesel motorships (most prominent in international trade) use chiefly heavy residual oil in their burners, with a small proportion of distillate oil (up to 10%) blended in for smooth flow and operation. Combustion of residual oils with their high average sulfur content (up to 3% by weight) contributes significantly to total SO_2 loading; for this reason, vessels bunkering residual fuel are the single most important transportation source generator of this pollutant. On the other hand, only a fraction of the residual fuel bunkered at U.S. ports will actually be burned by vessels in U.S. waters, and thus only that fraction will contribute to the national air pollutant inventory. According to Table 1.5 of the *Transportation Data Book: Edition 8*,[13] about 84% of the residual fuel and 38% of the distillate fuel consumed during waterborne activity is by vessels involved in U.S.-foreign trade. If 1% of the total is used entering and leaving U.S. ports, then only about 17% of total residual fuel combustion and 63% of total distillate fuel combustion by these commercial vessels occur in U.S. waters (distillate combustion in U.S. waters may actually be somewhat higher because ship in-port "hoteling" power requirements). Consequently, the following adjustments were made to the state-level vessel bunkering totals for 1985 (from EIA) for those states with Great Lakes and ocean port operations.

1. If a state has at least one major port involved in international trade, it was assigned 17% of the (1985) EIA value of residual sales (gallons) for vessel bunkering as its "fuel burned" commitment.

2. Ten percent (actually, 10.39% on a Btu equivalency basis) of this 17% of residual gallonage was subtracted from the 1985 EIA state total of distillate sales for vessel bunkering and assigned to steamship and motorship combustion (emission factors for steamship and motorship combustion differ from those for diesel barges).

3. If a state has a coastal location but *no* major international port, 75% of residual fuel sales to the state were assigned as the "fuel burned" commitment, in recognition of the fact that most of the residual consumption would result from coastwise operations. Again, 10% of this 75% was allocated from distillate vessel bunkering gallonage to steamship and motorship combustion.

4. The remaining distillate gallonage for coastal states was assigned to barge movements; however, if the state is not on the inland waterway network or has negligible mileage of navigable rivers, we assumed that the distillate is consumed in coastwise movements with only a 50% chance that its combustion would contribute to 48-state pollutant loading. This adjustment was necessary to ensure that no more than about 66% of total distillate combustion was assigned to U.S. waters.

5. For Great Lakes states, 90% of residual gallons sold were assumed to be burned in U.S. waters. Again, 10% of this 90% was deducted from distillate vessel bunkering gallonage and allocated to steamship and motorship operation, with the balance assigned 100% to waterway barges unless the state is also on the coast (for example, New York), in which case the 50% rule was applied.

The results of this allocation procedure were very encouraging. Even without normalization, the total distillate combustion commitment for barge and steam/motorship operations nationwide was about 65% of 1985 sales to vessel bunkering, and residual combustion commitment was 18% of total sales. The procedure described essentially parallels the routine programmed into TEEMS, the primary difference being that TEEMS uses forecast demand for fuel types in British thermal units, which are converted to gallons, while the allocation procedure used empirical consumption data for 1985.

Coastal states are assumed to maintain ice-free port facilities throughout the year; therefore, monthly activity totals are the same for all of 1985 (and 1986) in the emissions input file. Great Lakes states are assigned the same monthly activity profile as inland waterway movements because of the seasonal constraint. As appropriate, then, each state has up to three activity values for maritime transportation, each with its own *AP-42* emission factor set, which are thousand-gallon units of, respectively, (1) distillate fuel consumed by tug/tow barge movements in U.S. waters, (2) distillate fuel consumed in steamship and motorship burners operating in U.S. ports and waters, and (3) residual fuel consumed in those burners in U.S. waters.

5.1.2.7 Natural Gas Pipeline Compressors

Annual consumption of natural gas at the national level for 1985 is available from the EIA publication *Annual Energy Review 1985*.[14] Although state shares are not readily available, the TEEMS state-level allocator, which in turn is derived from data in

the *State Energy Data Report*,[15] was used on an interim basis. Again, state-level consumption is assumed to be the principal indicator of compressor activity. Monthly shares were computed from consumption data in the *Monthly Energy Review*.[4]

5.2 INDUSTRIAL PROCESSES

As discussed in Sec. 4, industrial process emissions are allocated to months on the basis of industrial activity data (see Table 7). Most often, these data are physical units of a representative product produced by the various sectors. Wherever possible, the same measures of production are also used to extend emission estimates from one year to the next.

Over the short run, this methodology may accurately project emissions from industrial processes. Over longer time horizons, however, this methodology does not take into account various efficiencies that might improve over time. For example, a process or an industry may become more efficient because of technology improvements or more stringent regulations, and emissions per unit output may decline. Or product mix may change, causing the emission factor to go up or down. The trend in product mix changes, however, is away from material processing and toward less-polluting downstream activities.

To check the hypothesis that the emission factors are changing from year to year, we ran regressions for each of six industrial process emission categories. The equation we used was:

$$\ln[\text{Emissions factor } (i,y)] = \ln[\beta(0)] + \beta_{1,i} \times \text{Year} \qquad (13)$$

where:

Emissions factor (i,y) = the ratio of emissions to our index of industrial production for sector i in year y (based on national data in Ref. 2),

$\ln[\beta(0)]$ = the intercept term, and

$\beta_{1,i}$ = the rate of change in the emission factor for sector i.

The results are summarized in Table 8. Five of the regressions yielded significant t-statistics, which leads us to believe our hypothesis is correct. Therefore, we have included, as part of the annual growth rate, a factor that accounts for changes in emission factors over time. The estimated annual growth rate for industrial VOC emissions becomes:

$$\text{Growth } (i,y) = \text{Activity } (i,y)/\text{Activity } (i,y-1) + \beta_{1,i} \qquad (14)$$

TABLE 7 Sources of VOC Emissions and Related Activity Data[a]

National Emissions Data: Sector Category	State-Level Emission Data: Source Categories from 1980 NAPAP	Monthly Activity Data Used for Monthly Shares	Annual Growth Indices for 1986
Electric Utilities Coal Combustion	Utility Coal Combustion	EIA-Monthly Coal Consumption	EIA-Monthly Coal Consumption
Electric Utilities Oil Combustion	Utility Residual and Distillate Oil Combustion	EIA-Monthly Oil Consumption	EIA-Monthly Oil Consumption
Electric Utilities Natural Gas	Utility Natural and Process Gas Combustion	EIA-Monthly Gas Consumption	EIA-Monthly Gas Consumption
Industrial Coal Combustion	Industrial Coal Combustion	Coal Weighted Industrial Index	MER-Industrial Coal Consumption
Industrial Oil Combustion	Industrial Residual and Distillate Oil Combustion	Oil Weighted Industrial Index	MER-Residual and Distillate Oil Consumption
Industrial Natural Gas Combustion	Industrial Natural and Process Gas Combustion	Natural Gas Weighted Industrial Index	MER-Natural Gas Consumption
Industrial Wood and Miscellaneous Fuels Combustion	Industrial Wood, Bagasse, and Coke Combustion	Uniform Distribution	Kept at 1985 Level
Commercial and Institutional Coal Combustion	Commercial and Institutional Coal Combustion	1982 Quarterly Coal Report	MER-Residential and Commercial Coal Combustion
Commercial and Institutional Oil Combustion	Commercial and Institutional Residual and Distillate Oil Combustion	Heating Degree-Days	MER-Residential and Commercial Residual and Distillate Oil Use
Commercial and Institutional Gas Combustion	Commercial and Institutional Natural Gas and Misc. Fuels Combustion	Heating Degree-Days	MER-Commercial and Institutional Natural Gas Consumption
Residential Coal Combustion	Residential Coal Combustion	Heating Degree-Days	MER-Commercial and Residential Coal Consumption

TABLE 7 (Cont'd)

National Emissions Data: Sector Category	State-Level Emission Data: Source Categories from 1980 NAPAP	Monthly Activity Data Used for Monthly Shares	Annual Growth Indices for 1986
Residential Oil	Residential Residual and Distillate Oil Combustion	Heating Degree-Days	MER-Commercial and Residential Residual and Distillate Oil Supplied
Residential Natural Gas	Residential Natural Gas Combustion	Heating Degree-Days	MER-Residential Natural Gas Consumption
Residential Wood and Misc. Fuels	Residential Wood and Misc. Fuel Combustion	Heating Degree-Days	Kept at 1985 Level
Automobiles and Motorcycles	Highway Statistics State VMT Share	Monthly Baseline Sales Reported by States	Annual Gasoline Sales Reported by States, Corrected for Efficiency and Emission Control Improvements
Light Gas Trucks	Highway Statistics State VMT Share	Monthly Baseline Sales Reported by States	Annual Gasoline Sales Reported by States, Corrected for Efficiency and Emission Control Improvements
Heavy Gas Trucks	Highway Statistics State VMT Share	Monthly Baseline Sales Reported by States	Annual Gasoline Sales Reported by States, Corrected for Efficiency and Emission Control Improvements
Light Diesel Trucks	Highway Statistics State VMT Share	Monthly Diesel Sales Reported by States	Annual Fuel Sales Reported by States, Corrected for Efficiency and Emission Control Improvements
Heavy Diesel Trucks	Highway Statistics State VMT Share	Monthly Diesel Sales Reported by States	Annual Fuel Sales Reported by States, Corrected for Efficiency and Emission Control Improvements
Railroads	State Fuel Sales to Railroads	Monthly Shipments	SCB-Class 1 Railroads, Traffic, Ton-Miles (revenue)
Civilian Aircraft	LTO Cycles	Monthly Passenger Boarding	SCB-Certified Route Carrier, Passenger-Miles (revenue)
Military Aircraft	NAPAP State Shares	Uniform Distribution	Kept at 1985 Level

TABLE 7 (Cont'd)

National Emissions Data: Sector Category	State-Level Emission Data: Source Categories from 1980 NAPAP	Monthly Activity Data Used for Monthly Shares	Annual Growth Indices for 1986
Barges and Shipping	State Fuel Sales to Shipping	Monthly Activity Indices	Kept at 1985 Level
Natural Gas Pipeline Consumption	TEEMS State Shares	MGR-Monthly Gas Pipeline Fuel Consumption	MER-Annual Gas Pipeline Fuel Consumption
Crude Oil Production	Crude Oil Production	MER-Crude Oil Production Domestic	MER-Crude Oil Production Domestic
Petroleum Refining	Petroleum and Petroleum Products	MER-Refinery Input	MER-Refined Products Refinery Input
Petroleum Storage and Transfer	Petroleum Products Storage and Transfer and Gasoline Marketed	MER-Gasoline Production	SCB-Refined Products Stocks at End of Period
Nondurable Goods Manufacture	Food and Beverages Textiles Graphic Arts Plastics Organic Chemicals Other Chemicals Rubber Tires	FRB-Nondurable Goods Manufacturing	FRB-Nondurable Goods Manufacturing
Durable Goods Manufacture	Iron and Steel Adhesives Degreasing Solvent Extraction Process Surface Coating Other Organic Solvent Use	FRB-Durable Goods Manufacturing	FRB-Durable Goods Manufacturing
Solid Waste Disposal	Solid Waste Disposal and Waste Incineration	Uniform Distribution	Kept at 1985 Level
Forest Fires	Forest Fires and Managed Burning Agricultural Burning	Seasonal Activity in NAPAP	Kept at 1985 Level

[a]Source documents are abbreviated as follows: TM-318 = Ref. 1, SCB = Ref. 3, MER = Ref. 4, and FRB = Ref. 5.

TABLE 8 Rate of Improvement in Control Efficiency: VOC

Sectors	Average Annual Percent Change in Emission Factor	t-value
Crude oil production	-0.87%	2.81
Petroleum refinery	-0.58%	0.86
Petroleum storage and transfer	-2.63%	25.25
Durable goods manufacture	-3.54%	4.33
Nondurable goods manufacture	-2.92%	6.36
Dry cleaning	-1.07%	10.56

where:

Growth (i,y) = adjusted growth index for industrial processes for sector i in year y,

Activity (i,y)/ Activity $(i,y-1)$ = growth index as described by the ratio of production in the current year over production in the previous year, and

$\beta_{1,i}$ = calculated adjustment for sector i from Eq. 13.

5.3 COMBUSTION AND OTHER SOURCES

5.3.1 Forest Wild Fires and Agricultural Burning

A significant percentage of VOC emissions come from forest wild fires and agricultural and managed burning. We introduced sector-specific seasonal shares from the 1980 NAPAP inventory model to estimate intra-annual fluctuations in these emissions.

5.3.2 Residential Fuel Combustion

VOC emissions from the residential sector dominate overall emissions from fuel combustion. In 1985, emissions from residential wood combustion alone accounted for nearly 95% of all nontransportation fuel combustion emissions of VOC. For this reason, the residential heat sector from the NO_x model has been broken down into its component fuels: coal, oil, gas, and wood. In addition, emissions from residential wood combustion, which previously had been allocated to a miscellaneous category and had been evenly distributed across the months, are now distributed on the basis of heating degree-days.

6 PROPOSED METHODOLOGY CHANGES

6.1 ELECTRIC UTILITIES

Utility emissions estimates could be improved by including unit-level data as they become available. With the current methodology, a weighted average emission factor for NO_x must be constructed by combining characteristics of the generating units at a plant and taking a weighted average of their different NO_x emission rates. The unit-level data come from the 1980 NURF file associated with the NAPAP inventory. The emissions estimates for plants in years later than 1980 can differ from actual emissions because the fuel use mix and the individual generating units may not be used in fixed proportions, as implied by the weighted-average plant index. Other problems can be introduced by inferring temporal emissions from the plant-level data. For example, two plants with the same total emissions but different compositions of baseload and peaking units can have very different time profiles of emissions. These problems can be addressed by using data at the generating-unit level of detail. This level of detail is provided by U.S. Department of Energy Form 767, the Steam-Electric Plant Operation and Design Report, which is completed annually for all U.S. plants of more than 100-MW capacity. Data on 50-MW plants may also be forthcoming.

Estimates could also be improved by obtaining better data on flue-gas desulfurization (FGD). At present, FGD data are obtained through the *Utility FGD Survey*.[16] Emission estimates in this report are based on the design efficiency of individual scrubber units. Because design and actual efficiency can differ, this method probably does not accurately represent a unit's actual operating efficiency.

6.2 INDUSTRIAL BOILERS

The NAPAP emissions inventory for industrial emissions could be used as the basic input in a combustion emissions update system, pending an ongoing quality assurance review of the NAPAP industrial fuel use data. The NAPAP inventory would provide the base-year distribution of fuel use and emission factors by fuel type, state, industry type, and application type (i.e., boiler versus process heater). These detailed fuel data would then be updated or calibrated to control totals of fuel use for the above categories. To update the fuel data, we would use a matrix balancing technique called iterative proportional fitting (IPF). This same process was used to update detailed demographic data in TEEMS[6] and to calibrate emission models to national control totals.[17] We choose to use a matrix balancing method for a variety of reasons.

First, the matrix balancing approach maintains sectoral detail. To the extent possible, a "bottom up" approach to updating the system is preferable. We wish to incorporate the level of detail embodied in the NAPAP data regarding energy use and emission factor characteristics for different states, industry types, etc. We also want to track changes in state-level industrial composition and fuel use as well as the requisite monthly variations. By using a multidimensional approach (i.e., more categories than just state and fuel type), we approximate a "bottom up" approach.

Second, the matrix balancing approach makes it possible to use the most current data as they become available. The most current control totals possible should be used for the update system. Monthly industrial fuel use, by fuel type, is readily available. However, state-level fuel use by industry (see Ref. 15) is not available for a full year. Similarly, data for specific two-digit Standard Industrial Classification (SIC) codes like those published by the U.S. Census Bureau are being updated.* Dun & Bradstreet estimates of boiler versus process fuel use, which are not available from any other published sources, would be helpful. Using the most recent SIC and application-specific data makes it possible to track important industrial composition changes as they affect energy use and emissions. The IPF approach requires only that share data for the various categories (e.g., state, industry, fuel type, application type) be provided. Although it would be best if all these data were for the same period, IPF will integrate the fuel use share provided to it in a consistent fashion.

Third, the matrix balancing approach is relatively easy to implement and improve. As data become available, initial estimates can be easily revised. Furthermore, published forecasts such as those produced by the Energy Information Administration or other industrial forecasting organizations may also be used as alternatives to revise outdated data sources. After the 1985 NAPAP inventory has been completed and undergone a quality assurance review for this purpose, it may replace the 1980 base year data.

6.3 SO_2 EMISSIONS FROM NONFERROUS SMELTERS

Nonferrous smelter emissions for 1975-1984 were computed with annual national values estimated in the EPA publication, *National Air Pollutant Emission Estimates, 1940-1984* (Ref. 2). To allocate these values to states, we multiplied them by state shares computed from the 1980 NAPAP Emissions Inventory. Monthly fractions, which were based on national monthly indices of nonferrous smelter production, were then applied to produce monthly state-level estimates. Emissions for 1985 and 1986 were estimated using growth rates from national production indices in the nonferrous smelting industry.

Inaccuracies introduced by using this approach include the following:

- State shares were assumed to have remained the same (at the 1980 level) during the 1975 to 1986 period. However, those shares may have varied significantly from year to year, depending on the operating practices of the individual smelters.

- National monthly fractions were assumed to apply in each state; however, variations in the operating patterns of individual smelters may have resulted in monthly shares being different at the state and national levels.

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*Preliminary data from the Energy Information Administration's Manufacturing Energy Consumption Survey are now available.

6.3.1 Primary Copper Production

The primary copper smelting industry has gone through several changes since 1975, including increased adoption of SO_2 control technologies (primarily sulfuric acid plants) and replacement of reverberatory furnaces with electric or flash furnaces to improve SO_2 control efficiencies. In addition, economic conditions and the inability of smelters to meet environmental regulations have prompted several temporary shutdowns (see Table 9).

To better account for industry fluctuations that affect SO_2 emissions, the current methodology can be improved by collecting data directly from state environmental agencies and individual smelters. An ongoing project has begun making this collection effort for the period 1975-1986. Emissions have been provided, on the basis of a plant-level sulfur balance approach, for the Arizona and New Mexico smelters on a quarterly (New Mexico) and monthly (Arizona) basis. It appears that annual SO_2 emissions inventories can be obtained for the remaining smelters over this period.

Once completed, these data will be checked against data compiled by the Environmental Defense Fund (EDF) for a study correlating smelter emissions with acidic deposition in the western United States. The monthly EDF data are available for Nevada, Utah, Arizona, and New Mexico for the years 1979-1985. Any discrepancies in reported emissions will be investigated. In addition, the 1985 data will be verified with the 1985 NAPAP inventory, which is due to be completed in early 1988.

For subsequent updates to the monthly state SO_2 emissions data base, this methodology should be used to the extent possible. As a result of state reporting requirements, data for Arizona and New Mexico should be accessible. If data are not available for other state smelters, emissions can be estimated by using 1985 as a base case together with smelter production data.

6.3.2 Primary Lead and Zinc Production

Because historical SO_2 emissions data for primary lead and zinc production are not available to the same extent as for those primary copper production, the current methodology should be maintained. The 1985 NAPAP inventory data, however, should replace the 1980 base-year data used here.

6.4 ON-HIGHWAY TRANSPORTATION SOURCES

6.4.1 Possible Refinements

In addition to the changes already incorporated into the VOC model (discussed in Sec. 6.1), several other refinements could be included to more accurately model transportation emissions. One refinement would incorporate the results of a systematic investigation of heavy-duty diesel-powered truck activity to assess how these (predominantly) long- and intermediate-range hauls are distributed. In many states, the share of these movements is well in excess of the state share of total VMT because of

TABLE 9 Operating Status of U.S. Primary Copper Smelters

Smelter, Location	Operating Status[a]	1980 SO_2 Emissions (tons/yr)
Asarco, El Paso, TX	O	44,000
Asarco, Hayden, AZ	O	107,000
Inspiration, Miami, AZ	O	17,000
Kennecott, Garfield, UT	O (ST-1985 to 1987)	27,000
Kennecott, Hurley, NM	O	65,000
Magma, San Manuel, AZ	O	109,000
Phelps Dodge, Hidalgo Playas, NM	O	21,000
Tenn Chemical, Copperhill, TN	O	-
Asarco, Tacoma, WA	SP-1985	102,000
Anaconda, Anaconda, MT	SP-1980	~200,000
Kennecott, Hayden, AZ	ST-1982	22,000
Kennecott, McGill, NV	ST-1983	86,000
Phelps Dodge, Douglas, AZ	ST-1985	258,000
Phelps Dodge, Ajo, AZ	ST-1985	54,000
Phelps Dodge, Morenci, AZ	ST-1984	102,000
White Pine, White Pine, MI	ST-1982	48,000

[a] O - Operating, ST - shut down temporarily, SP - shut down permanently.

the state's (1) location in principal shipment corridors, (2) well-developed highway systems, (3) significant contribution to total national shipment origins and destinations, or some combination of all three factors. Investigations of the dynamics and distribution of these truck movements are currently under way at several locations (e.g., Ref. 18).

Another possible refinement to overall highway activity would incorporate the impact of diurnal temperature variation on emission levels. Although the current procedure accounts for regional differences in monthly *average* temperatures, it does not incorporate extremes -- specifically, summer afternoon maximum and daily minimum values -- into the computation. To do so, some fraction of the monthly state highway activity totals by mode for urban and rural travel, respectively, must be allocated to the category of afternoon peak-period travel (the share of which may vary by size of urban area). These fractions must be multiplied by corresponding emission factors using

empirically observed afternoon peak temperatures. The remaining monthly activity would be multiplied by emission factors appropriate to nonpeak travel temperatures in each of the area types. Therefore, instead of summing two emission totals by vehicle type (urban and rural) from two sets of emission factors appropriate to average monthly temperatures, as is now done, the procedure would sum four totals that use factors derived from a somewhat broader state- and city-specific base of empirical meteorological information.

Yet another refinement would address the concern that has arisen in recent years about the effect of elevated summertime gasoline volatility on the evaporative emission rate for hydrocarbons. Gasoline with Reid vapor pressure (RVP) in excess of 9.0 psi (the volatility of indolence, the reference gasoline used by EPA in its evaporative certification test for new vehicles) can exceed the capacity of existing charcoal canisters to absorb and efficiently purge fuel tank and hot soak evaporative hydrocarbons. Because the American Society of Testing and Materials limits now permit seasonal gasoline volatility as high as 11.5 psi, and because summertime RVP has been measured as high as 13.2 psi in some parts of the country, it is generally acknowledged that gasoline evaporation from motor vehicles is much higher than that accounted for by MOBILE3 emission factors. The MOBILE3 factors assume a relatively high level of in-use compliance with the automobile evaporative emission standard of 2.0 g/test. Guidance will be sought from EPA regarding incorporation of an appropriate correction factor into the computation for warm-month on-highway emissions of VOCs. The next version of the MOBILE model, which is being programmed to account for both RVP variation and the possible regulations proposed to control excess evaporation, will be used for emission factor computation as soon as it is available.

6.4.2 Inventory Effects

National transportation estimates for 1985 are presented in Table 10 for VOC, NO_x, and SO_2 emissions. As expected, applying the procedure described in Sec. 6.1 to region-specific emission factors from EPA's MOBILE3 model and *AP-42* report amplifies total VOC emissions, because of the pronounced nonlinear increase in exhaust VOCs at low average temperatures and speeds. Total NO_x emission estimates are reduced, primarily because of the lower average operating speeds relative to an inventory or estimate that applies an average aggregate emission factor for each pollutant by vehicle type. Moreover, SO_2 is considerably reduced because the vehicular fleets are assumed to be more fuel efficient than what is reflected in the *AP-42* factors. More will be said on this point later.

For comparison, Table 11 shows the average VOC emission rates for on-highway gasoline-burning vehicles that would give rise to the first three VOC totals in Table 10, and the corresponding average emission factors used by EPA to estimate net emission reductions of gasoline volatility control as reported in Tables 3-7 through 3-10 of the *Draft Regulatory Impact Analysis: Control of Gasoline Volatility and Evaporative Hydrocarbons from New Motor Vehicles.*[19] (EPA reports an emission factor for 1983 and a baseline -- no control -- factor for 1990 by vehicle type; a factor for 1985 was interpolated from each set of these two values.)

TABLE 10 1985 Emissions from Transportation Sources (10^3 metric tons)

Pollutant Source	VOC	NO_x	SO_2
Automobiles	5,780	2,509	128
Light-duty trucks	2,960	1,038	41
Heavy-duty gasoline-powered trucks	654	155	11
Heavy-duty diesel-powered trucks	370	1,802	182
Locomotives	154	542	85
Aircraft	92	86	10
Commercial vessels	28	163	134
Pipelines	9	235	-
Total[a]	10,047	6,530	591

[a]Does not include farm machinery, construction equipment, industrial and mining machinery, recreational vessels (e.g., powerboats, snowmobiles), or lawn and garden equipment.

TABLE 11 Comparison of Average VOC Emission Rates (g/mile)

	Monthly Estimator	
Pollutant Source	Argonne	EPA[a]
Automobiles	4.45	4.30
Light-duty trucks	8.53	6.80
Heavy-duty gasoline-powered trucks	18.42	13.10

[a]Interpolated for 1985 from 1983 and 1990 data.

The effects of operation at a lower average speed in low ambient temperature for at least part of the year, in the realm of the VOC emission factor curve in which emission rates increase almost exponentially (rather than linearly) with each 5-degree or 1 mph decrease, are especially severe for trucks, as Table 11 clearly indicates. Using an "annual average conditions" factor drawn from the more linear range of the speed/temperature correction curve can substantially underestimate transportation VOCs while overestimating NO_x emissions. To ensure that the modification incorporated in the current procedure does not overcorrect for this problem, however, the speed assumptions described in Ref. 20 remain under review and subject to modification.

Another relevant comparison is shown in Table 12, which compares the Argonne inventory of national on-highway transportation emissions of SO_2 with an inventory developed with uncorrected *AP-42* factors and with an inventory for 1985 from the January 1987 EPA trends report. The AP-42 factors are representative of vehicles on the road in the early- to mid-1970s; consequently, they embody a low average fuel economy relative to today's fleet. Therefore, for the ANL model, these factors were adjusted to update the fuel efficiency component while assuming no change to average fuel sulfur content. (The specific adjustment is discussed in Ref. 20, which describes the input specifications for the transportation component of the 1985 NAPAP test runs.) The inclusion of improved fuel consumption rates relative to the 1970s values, a feature unique to the ANL method, produces a substantial net reduction in the highway inventory. The result is a highway SO_2 inventory uniformly lower than a counterpart based strictly on *AP-42* factors, although activity data are clearly consistent across the three estimates.

In summary, using available data to estimate monthly transportation activity and emissions by state brings into stark relief the effect of excess (or reduced) emissions under transient (cold weather, low speed) conditions on a total inventory. Although such conditions affect only the emission factors for on-highway vehicles, they account for a large proportion of the total difference relative to an "average" inventory because highway sources dominate the total. The excess VOC phenomenon is most noteworthy in

TABLE 12 Monthly Highway SO_2 Emissions for 1985 from Three Perspectives (10^3 metric tons)

Pollutant Source	Monthly Estimate		
	Argonne	AP-42	EPA
Automobiles	128	182	180
Light-duty trucks	41	67	64
Heavy-duty gasoline-powered trucks	11	13	10
Heavy-duty diesel-powered trucks	182	221	220

cold months, when O_3 formation is not a problem, so correction of average-factor computations may not be essential. On the other hand, the NO_x emission burden attributed to highway transportation in many nationwide inventories may well be overstated because the implicit average operating speeds are too high. In conclusion, a transportation emission inventory use should be based on emission computations that seek to incorporate representative, location-specific (rather than averaged) data.

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APPENDIX A:

SO_2, NO_x, AND VOC EMISSIONS BY MONTH FOR STATES
(in thousand metric tons)

TABLE A.1 1985 Total Monthly SO_2 Emissions by State (10^3 t)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
ALABAMA	67.0	51.2	50.6	50.8	64.0	67.6	68.3	65.7	63.6	63.0	57.2	67.2	736
ARIZONA	44.6	38.6	44.0	44.9	50.2	41.4	45.5	42.0	42.2	43.5	39.0	43.8	520
ARKANSAS	9.9	8.9	8.6	9.1	9.7	10.9	11.2	10.8	9.3	8.9	8.4	9.9	116
CALIFORNIA	24.3	23.7	24.5	24.7	24.5	24.1	24.3	24.4	24.0	24.6	24.6	24.9	293
COLORADO	10.2	9.3	10.3	9.9	10.8	10.9	11.0	11.6	10.9	10.8	10.5	10.5	127
CONNECTICUT	7.1	6.4	6.0	5.1	5.2	4.8	4.4	5.1	4.5	6.1	6.3	7.5	69
DELAWARE	11.7	11.8	11.2	8.4	7.4	8.2	8.1	9.8	8.2	11.0	9.0	11.1	116
DIST OF COL	1.4	1.3	1.2	0.5	0.5	0.4	0.9	0.9	0.9	0.9	1.0	1.1	11
FLORIDA	52.6	43.3	43.1	45.9	50.3	58.4	57.0	62.3	53.1	50.1	47.0	51.7	615
GEORGIA	87.1	71.5	71.6	70.6	82.8	87.4	90.6	93.5	82.9	76.4	69.5	78.0	962
IDAHO	4.4	4.3	4.3	3.7	3.6	3.6	3.8	3.9	4.0	4.1	4.2	4.2	48
ILLINOIS	120.1	104.0	105.8	98.1	97.5	102.9	116.6	108.9	97.7	87.6	108.9	124.4	1272
INDIANA	150.9	133.9	139.3	131.6	129.8	125.3	135.2	134.5	123.4	127.2	124.0	148.3	1603
IOWA	22.8	22.4	22.0	22.4	19.4	19.5	22.8	21.1	19.9	22.6	23.9	22.5	261
KANSAS	21.1	14.3	14.5	15.3	15.8	18.1	23.9	21.8	17.8	16.2	15.5	16.3	211
KENTUCKY	79.0	67.3	63.4	68.0	75.8	76.6	77.4	77.9	73.6	69.9	67.9	81.8	879
LOUISIANA	39.8	35.9	33.9	24.6	22.7	22.6	24.0	23.6	22.1	25.6	32.7	41.5	349
MAINE	5.6	5.3	5.3	4.6	4.8	4.8	4.4	5.1	5.4	6.1	5.6	6.1	63
MARYLAND	20.6	19.3	15.9	16.3	18.7	20.4	26.7	24.8	21.4	19.9	20.7	22.3	247
MASSACHUSETTS	29.2	25.7	22.8	18.2	16.6	17.9	19.5	19.9	18.3	19.4	22.7	28.2	258
MICHIGAN	49.1	44.3	45.4	45.4	46.4	48.0	51.2	53.8	51.0	52.0	49.0	53.1	589
MINNESOTA	15.4	14.6	13.4	11.9	11.7	11.0	11.4	10.9	13.4	14.3	13.7	14.0	156
MISSISSIPPI	19.8	18.4	17.6	14.7	13.5	16.6	16.5	17.7	15.1	16.2	16.8	18.9	202
MISSOURI	111.6	89.8	81.6	85.5	78.5	80.6	93.4	82.7	78.2	73.1	73.4	73.3	1002
MONTANA	9.6	9.4	10.1	9.3	8.7	8.2	10.0	9.5	9.5	9.7	9.0	9.4	113
NEBRASKA	6.1	5.5	4.7	4.6	4.5	4.7	5.5	5.2	4.6	6.2	6.3	6.6	65
NEVADA	11.0	10.8	12.3	10.5	9.5	7.4	7.2	6.7	6.6	6.8	6.5	8.1	103
NEW HAMPSHIRE	6.1	7.2	7.4	3.7	6.1	5.6	7.4	7.5	7.7	8.4	5.8	6.8	80
NEW JERSEY	22.9	21.3	20.0	15.6	11.8	13.1	15.3	14.7	13.8	15.2	17.1	20.8	202
NEW MEXICO	18.4	17.3	18.3	17.6	20.3	18.3	18.5	17.9	18.2	18.9	17.5	18.4	220
NEW YORK	65.7	62.0	59.8	51.5	49.9	48.8	53.7	54.3	50.6	49.8	51.1	60.2	657
NORTH CAROLINA	39.9	36.0	37.1	35.8	34.7	36.9	35.9	34.8	31.0	31.6	27.3	33.8	415
NORTH DAKOTA	13.2	13.1	12.7	11.3	10.3	10.0	10.6	10.4	9.0	10.7	11.5	12.1	135
OHIO	229.0	194.1	191.0	187.4	191.7	199.5	209.4	214.2	205.0	194.4	189.9	221.4	2427
OKLAHOMA	11.0	10.9	10.8	10.2	9.6	10.8	12.2	12.6	11.7	9.9	10.7	10.8	131

TABLE A.1 (Cont'd)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
OREGON	3.2	3.0	2.9	2.6	2.6	2.5	3.5	3.7	2.5	2.8	2.9	3.0	35
PENNSYLVANIA	141.4	126.5	128.9	130.6	131.3	123.0	131.3	131.3	114.8	111.5	109.4	135.2	1515
RHODE ISLAND	0.8	0.7	0.6	0.5	0.5	0.4	0.3	0.4	0.4	0.6	0.7	1.0	7
SOUTH CAROLINA	19.3	16.2	14.7	16.4	19.5	20.6	22.0	23.0	19.1	20.7	18.6	20.3	230
SOUTH DAKOTA	3.4	3.4	3.5	3.5	2.5	3.3	3.4	2.8	2.0	3.6	3.5	3.5	39
TENNESSEE	70.8	59.8	66.0	73.9	75.8	76.4	78.7	78.6	74.2	68.8	77.9	83.5	884
TEXAS	84.2	80.2	78.3	72.5	82.4	87.0	90.0	90.5	85.2	80.0	79.4	88.1	998
UTAH	6.7	6.6	7.2	6.4	6.4	6.4	7.1	7.0	6.3	6.5	6.9	7.4	81
VERMONT	0.7	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.5	0.4	0.5	0.7	6
VIRGINIA	25.2	21.7	20.1	18.0	18.5	20.2	21.5	22.7	20.8	20.3	20.8	25.9	256
WASHINGTON	20.8	21.7	23.6	15.3	13.2	13.0	21.7	21.0	20.6	21.2	20.8	23.0	236
WEST VIRGINIA	93.0	80.5	87.6	80.7	79.1	71.0	84.5	86.0	78.9	85.7	79.6	85.4	992
WISCONSIN	36.6	37.5	39.2	37.1	35.8	35.4	36.3	36.0	34.1	35.6	39.3	39.5	442
WYOMING	15.2	14.7	14.6	13.8	13.7	13.4	15.0	15.7	15.5	16.2	15.7	16.6	180
NATIONAL TOTALS	1959	1726	1728	1660	1699	1718	1849	1840	1703	1685	1680	1902	21152

TABLE A.2 1986 Total Monthly SO_2 Emissions by State (10^3 t)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
ALABAMA	68.0	59.9	60.7	57.1	61.1	63.0	70.3	65.9	63.0	58.1	52.8	56.9	737
ARIZONA	48.5	41.7	45.5	43.2	44.3	43.6	46.7	47.6	47.7	47.9	45.2	47.6	549
ARKANSAS	10.0	8.5	8.4	7.5	8.8	10.7	11.9	11.1	11.4	8.4	9.1	11.1	117
CALIFORNIA	26.6	25.5	26.1	26.4	26.2	25.2	25.1	26.6	25.3	25.4	25.3	25.3	309
COLORADO	10.5	9.8	10.4	10.1	10.3	11.1	11.5	11.6	11.2	11.2	10.1	10.6	128
CONNECTICUT	8.6	7.5	6.2	5.2	4.8	4.7	6.3	5.4	4.9	5.5	5.8	6.9	72
DELAWARE	12.0	10.8	9.2	8.6	8.5	9.3	9.4	9.4	8.6	8.5	9.7	11.9	116
DIST OF COL	1.3	1.3	1.2	0.5	0.6	0.6	1.1	0.9	0.9	1.0	1.0	1.1	11
FLORIDA	54.3	44.1	47.5	46.7	54.5	59.7	67.2	68.7	63.8	58.2	54.0	52.6	671
GEORGIA	78.2	63.1	73.6	70.7	76.0	85.7	89.5	83.7	77.3	71.5	69.6	67.5	906
IDAHO	4.5	4.3	4.4	3.8	3.7	3.6	3.8	3.9	4.0	4.1	4.2	4.3	49
ILLINOIS	120.8	112.0	102.6	94.5	87.9	113.1	126.9	109.9	105.4	97.7	95.9	95.3	1262
INDIANA	148.3	134.9	124.2	116.7	121.8	119.7	143.7	127.1	120.2	122.9	117.7	128.8	1526
IOWA	24.1	21.6	22.4	17.6	17.8	19.7	25.6	20.8	17.4	21.4	23.2	25.5	257
KANSAS	16.5	14.1	16.6	17.8	14.7	18.0	22.5	17.2	16.3	17.8	18.1	14.1	204
KENTUCKY	76.8	69.3	68.2	58.4	71.7	80.4	87.9	76.5	75.0	71.7	70.3	71.9	878
LOUISIANA	42.7	37.0	33.1	23.9	20.1	21.1	23.8	24.8	22.9	26.8	35.9	42.0	354
MAINE	6.6	6.4	6.3	5.4	5.3	5.5	5.9	6.2	5.6	6.0	5.9	6.2	72
MARYLAND	23.4	22.1	20.6	16.3	21.0	24.8	26.6	25.4	21.0	21.3	19.6	23.3	265
MASSACHUSETTS	27.2	27.0	27.0	20.8	22.1	21.2	24.6	23.6	19.7	19.3	22.1	27.6	282
MICHIGAN	58.1	46.0	47.8	44.9	48.2	54.0	59.2	55.2	51.7	52.9	50.8	53.7	622
MINNESOTA	10.7	9.7	10.4	9.5	10.6	10.1	10.0	8.3	8.5	9.8	10.5	10.5	119
MISSISSIPPI	20.7	17.0	19.8	17.1	14.7	17.1	22.6	19.8	15.5	13.8	16.7	21.8	217
MISSOURI	80.3	72.8	80.7	69.8	67.1	86.4	107.7	89.2	79.0	76.2	84.6	88.8	983
MONTANA	10.3	9.4	8.8	8.8	9.1	9.1	10.0	10.7	10.7	11.0	10.7	10.7	119
NEBRASKA	5.0	4.6	5.5	4.7	4.1	4.2	5.6	4.8	3.8	4.2	4.5	5.2	56
NEVADA	11.5	9.5	11.4	11.2	11.7	10.2	11.3	11.3	10.8	10.2	8.5	11.1	129
NEW HAMPSHIRE	7.5	6.7	8.1	7.1	5.1	3.8	4.6	4.4	4.1	5.9	6.1	6.7	70
NEW JERSEY	20.1	19.0	17.4	15.1	13.4	14.2	15.2	14.2	12.5	14.9	16.6	19.1	192
NEW MEXICO	19.4	17.5	18.6	17.3	19.3	19.5	19.8	17.5	18.9	19.3	17.5	19.0	224
NEW YORK	59.9	57.2	58.5	49.8	47.2	45.1	49.8	49.0	44.7	48.4	51.7	59.3	621
NORTH CAROLINA	36.9	33.1	36.6	32.7	35.5	45.5	42.7	41.3	39.2	38.9	34.7	26.0	443
NORTH DAKOTA	11.0	10.9	10.5	10.1	7.6	7.0	8.9	9.4	8.3	9.9	9.0	9.2	112
OHIO	209.1	212.1	212.6	195.5	197.3	220.4	225.1	207.5	199.0	179.9	192.8	202.6	2454
OKLAHOMA	11.4	10.2	8.9	9.4	9.1	11.6	13.7	13.0	12.1	10.3	9.9	11.4	131

TABLE A.2 (Cont'd)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
OREGON	3.4	3.1	3.0	2.7	2.7	2.6	2.5	2.6	2.6	2.9	3.0	3.1	34
PENNSYLVANIA	138.5	125.8	126.9	113.1	110.8	118.7	128.4	125.9	118.9	115.5	122.6	135.7	1481
RHODE ISLAND	0.9	0.9	0.8	0.8	0.7	0.5	0.7	0.5	0.6	0.6	0.8	0.9	9
SOUTH CAROLINA	20.2	16.0	16.2	17.6	19.4	22.6	24.1	22.5	18.3	18.8	16.8	16.1	229
SOUTH DAKOTA	3.8	3.7	3.6	2.8	1.6	1.2	3.5	3.1	3.5	2.3	3.5	3.7	36
TENNESSEE	89.0	72.1	78.8	68.3	69.9	70.9	79.1	79.3	76.1	70.4	69.7	74.7	898
TEXAS	95.2	91.4	80.7	80.8	86.0	91.7	97.7	96.8	92.3	90.8	86.8	94.8	1085
UTAH	7.6	7.0	6.5	6.4	6.1	6.1	7.6	7.8	7.6	7.6	8.4	8.8	88
VERMONT	0.7	0.7	0.6	0.5	0.5	0.4	0.3	0.3	0.4	0.4	0.5	0.6	6
VIRGINIA	26.2	23.5	22.4	18.1	19.8	25.3	27.5	24.1	22.5	20.7	21.5	25.9	278
WASHINGTON	20.5	17.0	13.5	12.8	13.1	12.8	15.1	17.6	17.0	18.6	19.3	20.1	197
WEST VIRGINIA	85.9	81.2	83.7	73.3	80.7	75.0	81.6	73.7	70.5	82.7	83.7	82.1	954
WISCONSIN	37.2	34.3	36.1	32.7	33.7	32.8	35.8	32.4	32.9	34.6	34.9	33.9	411
WYOMING	18.7	15.4	13.3	12.9	13.5	13.5	13.9	14.9	14.7	13.6	14.7	15.9	175
NATIONAL TOTALS	1929	1749	1756	1597	1640	1773	1954	1823	1718	1690	1706	1802	21136

TABLE A.3 1985 Total Monthly NO_x Emissions by State (10^3 t)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
ALABAMA	38.7	31.5	31.9	34.0	37.3	37.8	39.5	37.8	35.9	36.2	34.4	37.7	433
ARIZONA	20.6	17.5	18.9	19.0	21.5	23.1	22.4	22.2	21.7	20.5	20.1	21.6	249
ARKANSAS	19.5	18.5	17.6	20.5	20.5	22.3	21.9	21.1	21.1	18.0	20.6	21.7	243
CALIFORNIA	98.0	91.4	96.4	94.4	94.1	93.8	99.1	98.8	92.8	97.5	97.8	99.3	1153
COLORADO	25.2	23.3	25.0	21.9	23.1	23.6	24.0	24.7	23.2	24.1	24.8	25.7	289
CONNECTICUT	11.7	10.7	10.9	10.3	10.4	9.7	10.1	10.7	9.8	11.0	11.2	12.4	129
DELAWARE	6.3	6.2	6.2	5.1	5.6	4.3	5.2	5.8	4.6	6.2	5.0	5.9	67
DIST OF COL	2.1	2.4	2.4	2.0	1.3	1.9	1.9	1.8	1.7	1.9	2.0	2.2	24
FLORIDA	58.5	51.9	54.4	55.4	57.1	58.9	58.1	60.0	53.4	55.2	53.0	59.1	675
GEORGIA	51.6	45.6	47.0	46.8	51.2	51.2	52.7	53.6	48.8	48.4	44.9	49.3	591
IDAHO	7.1	7.7	5.7	6.9	7.3	5.7	7.1	8.0	6.2	8.0	7.6	5.9	83
ILLINOIS	75.8	63.4	66.7	74.1	64.7	64.1	71.2	65.7	63.8	67.6	73.9	82.1	833
INDIANA	65.1	58.8	59.5	59.7	61.7	59.6	59.9	61.2	53.7	59.2	57.7	63.1	719
IOWA	24.0	23.7	25.5	23.5	23.7	22.9	23.3	22.7	22.6	22.9	24.2	26.5	285
KANSAS	36.4	32.6	32.4	32.7	32.5	34.2	36.8	35.0	32.9	31.6	32.7	34.6	405
KENTUCKY	50.0	44.1	45.3	46.1	48.3	49.4	49.6	50.4	48.3	46.5	46.1	52.0	576
LOUISIANA	53.9	50.3	51.6	49.1	48.5	51.5	52.2	49.9	51.0	44.3	47.0	58.3	608
MAINE	4.7	4.4	4.3	4.0	4.2	4.0	4.5	4.8	4.6	4.9	4.7	5.1	54
MARYLAND	18.9	17.7	18.1	18.4	19.7	19.2	22.1	21.0	19.2	20.0	19.9	21.5	236
MASSACHUSETTS	25.0	22.5	23.4	21.2	19.8	20.1	21.5	21.6	20.8	21.1	21.7	24.8	264
MICHIGAN	56.1	49.7	52.8	49.7	49.2	51.6	53.1	54.9	52.6	54.9	55.0	61.4	641
MINNESOTA	27.4	26.4	25.8	24.6	24.3	23.0	24.4	24.8	26.6	26.3	27.3	26.9	308
MISSISSIPPI	17.7	21.5	18.6	20.4	17.4	19.6	20.3	17.4	21.8	19.3	18.7	20.1	233
MISSOURI	47.6	38.5	39.2	38.3	35.0	36.5	40.6	38.1	37.6	36.4	38.3	39.2	465
MONTANA	11.5	10.9	11.8	10.5	8.7	11.4	11.0	11.8	11.9	11.6	10.1	10.5	132
NEBRASKA	13.7	13.0	12.8	11.7	12.5	12.7	12.3	12.6	12.0	13.3	13.7	14.2	155
NEVADA	9.1	10.2	10.3	8.2	8.8	7.2	7.1	8.8	6.4	6.4	8.2	7.6	98
NEW HAMPSHIRE	4.2	4.2	4.7	3.1	3.9	4.1	5.0	4.7	4.8	5.5	4.2	5.1	54
NEW JERSEY	39.8	37.7	38.1	35.2	33.4	33.2	36.5	36.1	34.2	33.5	38.0	37.2	433
NEW MEXICO	23.8	17.5	16.6	19.2	19.1	17.0	20.3	18.1	16.7	21.1	16.9	18.0	224
NEW YORK	54.3	60.6	59.4	49.3	48.6	50.4	65.9	53.8	58.8	55.5	57.8	66.4	681
NORTH CAROLINA	37.5	36.7	37.0	36.8	37.0	37.4	36.6	36.6	34.7	34.0	33.1	38.7	436
NORTH DAKOTA	13.1	13.8	12.2	13.0	10.0	12.7	12.9	11.1	12.1	11.2	14.2	13.4	150
OHIO	95.0	84.7	85.6	83.0	85.3	84.3	86.9	87.7	84.1	87.8	84.6	95.6	1045
OKLAHOMA	30.1	31.3	31.4	29.7	29.5	32.9	33.8	33.8	33.8	28.2	30.7	32.4	378

TABLE A.3 (Cont'd)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
OREGON	16.7	16.7	18.0	17.6	17.8	18.7	19.9	20.4	18.2	17.6	17.6	17.3	217
PENNSYLVANIA	79.0	72.2	74.9	73.7	74.2	68.9	73.2	73.8	68.2	69.9	70.3	78.7	877
RHODE ISLAND	2.7	2.6	2.6	2.6	2.5	2.4	2.4	2.5	2.6	2.8	2.8	3.0	31
SOUTH CAROLINA	20.7	17.6	17.2	20.6	20.2	21.2	21.5	22.1	19.5	21.3	19.2	21.6	243
SOUTH DAKOTA	5.7	5.4	5.6	5.6	5.2	5.6	6.1	5.5	4.6	6.2	6.0	5.7	67
TENNESSEE	37.2	33.2	36.5	36.9	38.6	41.9	40.2	38.8	39.7	38.0	38.0	42.2	461
TEXAS	202.5	193.5	198.2	193.2	205.1	213.3	216.9	223.5	209.8	202.1	198.5	213.4	2470
UTAH	10.0	11.3	10.8	9.9	12.0	11.1	11.3	13.2	10.3	11.0	12.6	12.0	135
VERMONT	2.3	4.1	2.1	2.1	3.7	2.7	2.2	3.9	2.2	2.9	3.6	2.6	34
VIRGINIA	29.1	27.5	26.3	27.3	26.8	28.1	28.0	30.3	26.8	28.7	26.3	32.1	337
WASHINGTON	20.5	22.4	22.8	18.8	14.9	19.9	27.5	17.3	29.5	16.7	28.0	23.8	262
WEST VIRGINIA	38.5	34.8	37.4	33.8	32.9	30.5	37.1	36.4	33.3	37.3	34.7	37.4	424
WISCONSIN	32.0	31.5	33.2	31.6	31.9	30.7	32.0	31.6	30.7	32.4	33.5	36.0	387
WYOMING	21.0	20.3	20.6	19.3	19.3	19.9	22.0	22.6	21.5	21.5	21.4	22.2	252
NATIONAL TOTALS	1692	1574	1606	1571	1580	1606	1690	1669	1601	1598	1613	1743	19544

TABLE A.4 1986 Total Monthly NO_x Emissions by State (10^3 t)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
ALABAMA	38.7	34.5	34.9	36.5	35.2	36.4	40.8	37.3	35.4	35.3	32.5	34.9	432
ARIZONA	21.0	18.7	18.9	17.1	17.5	18.9	20.4	21.0	20.2	17.8	18.2	21.0	231
ARKANSAS	20.1	18.2	18.3	16.9	17.3	22.0	24.1	22.7	23.4	16.0	25.7	23.4	248
CALIFORNIA	96.5	89.9	94.2	94.5	95.4	93.4	96.5	100.0	93.6	98.0	98.4	101.6	1152
COLORADO	25.2	24.2	24.6	23.3	23.5	24.6	24.0	24.4	23.8	23.2	24.3	25.7	291
CONNECTICUT	12.6	11.3	11.5	10.7	10.7	10.2	10.6	10.7	10.2	10.8	10.9	12.3	133
DELAWARE	6.6	5.9	5.2	5.2	5.9	4.5	5.5	5.6	4.9	5.1	5.5	6.3	66
DIST OF COL	2.2	2.1	2.2	1.8	1.9	1.8	1.9	1.8	1.8	2.0	2.4	2.2	24
FLORIDA	59.0	53.9	57.4	53.8	58.2	58.8	61.8	61.6	59.6	58.0	54.8	59.6	696
GEORGIA	48.8	42.5	48.0	47.1	48.1	50.5	53.3	50.3	48.5	47.1	46.0	47.2	577
IDAHO	7.6	7.5	5.7	6.9	7.1	5.9	8.3	7.1	6.3	8.2	7.9	6.1	85
ILLINOIS	79.3	70.6	69.7	65.0	64.7	69.4	78.6	67.0	67.3	67.6	66.9	74.2	840
INDIANA	63.4	58.2	61.8	57.8	58.4	60.0	62.6	63.6	50.9	58.9	56.9	59.5	712
IOWA	24.2	23.9	23.7	20.9	21.5	24.8	26.1	23.2	22.5	23.7	24.2	27.7	286
KANSAS	33.3	31.8	32.5	31.8	31.8	33.8	35.0	32.8	30.6	31.2	33.9	34.0	392
KENTUCKY	53.0	48.5	49.0	44.1	49.0	52.6	54.6	51.9	50.5	46.7	52.5	50.9	603
LOUISIANA	56.4	48.5	49.6	45.0	44.1	48.3	49.4	48.3	49.0	51.6	53.3	55.9	599
MAINE	4.9	4.8	4.6	4.0	4.9	4.0	5.4	5.0	4.8	4.6	4.6	5.1	57
MARYLAND	21.2	19.5	20.9	18.5	20.2	21.5	22.2	21.0	19.8	21.2	18.8	22.1	247
MASSACHUSETTS	23.8	23.2	24.1	21.8	21.8	20.9	21.6	21.7	20.3	21.3	22.1	25.3	268
MICHIGAN	60.6	50.7	52.7	51.3	52.3	58.1	56.9	55.0	53.5	54.5	55.1	60.6	661
MINNESOTA	25.6	24.1	27.1	24.3	26.8	25.9	26.2	24.6	24.0	24.6	27.0	26.8	307
MISSISSIPPI	19.1	17.6	19.4	19.7	17.7	19.6	21.7	20.1	19.4	17.8	18.3	20.4	231
MISSOURI	39.5	35.0	39.0	38.8	33.5	38.7	47.0	39.9	39.0	38.1	39.2	44.3	472
MONTANA	12.4	10.7	9.3	9.8	9.6	10.0	14.0	13.9	14.2	14.7	13.8	13.0	145
NEBRASKA	12.9	12.2	14.1	12.1	12.4	12.6	12.9	12.7	11.3	12.5	12.7	14.2	153
NEVADA	9.8	9.2	7.8	8.5	9.9	8.0	9.8	10.5	8.1	7.8	8.6	8.4	106
NEW HAMPSHIRE	4.8	4.3	4.9	4.7	3.6	3.2	3.5	3.4	3.5	4.2	4.1	4.8	49
NEW JERSEY	39.8	37.3	34.4	36.0	35.3	35.5	32.4	34.0	31.9	33.4	33.2	39.7	423
NEW MEXICO	23.3	17.1	16.1	18.3	16.7	16.2	20.9	15.7	14.9	18.6	17.0	16.6	212
NEW YORK	71.1	59.5	54.2	63.7	59.7	52.0	54.1	53.3	50.7	44.7	56.3	63.6	683
NORTH CAROLINA	36.6	34.9	39.0	35.7	36.9	42.1	40.0	39.7	38.5	35.6	37.8	34.9	452
NORTH DAKOTA	12.7	11.4	12.4	12.9	9.9	11.8	12.4	12.2	13.8	11.1	14.5	13.1	148
OHIO	92.3	88.7	89.5	86.8	85.7	88.7	93.9	88.7	85.7	84.5	87.2	92.0	1064
OKLAHOMA	30.4	29.2	27.1	29.4	27.9	32.7	35.6	33.5	31.6	27.8	29.4	33.1	368

TABLE A.4 (Cont'd)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
OREGON	16.5	16.7	17.8	17.1	18.2	18.8	19.0	18.8	18.6	17.8	17.5	17.3	214
PENNSYLVANIA	78.8	71.9	74.7	71.4	70.6	71.4	74.2	73.8	69.3	70.7	72.3	79.6	879
RHODE ISLAND	2.8	2.8	2.7	2.7	2.5	2.4	2.6	2.6	2.6	2.7	2.8	3.0	32
SOUTH CAROLINA	20.9	18.1	20.0	19.4	19.8	22.8	23.7	22.2	20.0	20.1	18.7	20.0	246
SOUTH DAKOTA	5.7	5.2	5.8	5.0	4.8	4.3	6.2	5.8	5.5	5.2	5.9	5.9	65
TENNESSEE	42.4	35.5	40.0	37.2	38.9	39.8	38.6	40.2	38.8	36.8	36.6	39.6	465
TEXAS	202.0	191.4	193.2	189.9	196.9	198.6	216.4	210.1	202.1	195.7	191.5	206.4	2394
UTAH	12.8	10.9	9.5	9.3	11.5	10.7	12.4	14.8	12.0	12.0	14.4	13.8	144
VERMONT	2.5	3.7	2.4	2.5	3.5	2.5	2.1	4.4	2.5	2.1	4.4	2.7	35
VIRGINIA	25.4	25.6	24.3	23.0	70.0	28.9	26.7	25.0	24.1	24.6	24.0	26.3	348
WASHINGTON	16.5	22.1	18.5	17.5	19.8	26.7	15.6	23.2	24.8	15.5	29.6	23.6	254
WEST VIRGINIA	35.9	34.4	35.9	33.1	34.6	33.1	36.6	32.6	31.8	37.2	35.3	35.6	416
WISCONSIN	34.4	31.3	34.8	32.4	32.8	32.0	34.4	32.0	31.4	33.9	33.8	35.5	399
WYOMING	22.6	18.8	18.1	16.7	17.1	17.8	19.1	21.0	19.2	17.6	19.6	20.5	228
NATIONAL TOTALS	1708	1568	1601	1552	1616	1627	1712	1661	1586	1570	1620	1710	19533

TABLE A.5 1985 Total Monthly VOC Emissions by State (10^3 t)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
ALABAMA	29.5	28.4	29.5	27.5	25.5	25.7	26.3	25.8	24.9	26.9	30.6	30.7	331
ARIZONA	14.2	13.0	14.4	13.3	12.4	13.1	12.5	12.6	12.8	13.0	14.4	14.2	160
ARKANSAS	15.2	14.9	15.0	13.4	12.6	12.8	12.6	12.8	12.8	13.3	15.7	16.0	167
CALIFORNIA	126.1	121.4	128.2	129.5	128.6	127.5	127.6	130.8	125.8	129.7	130.6	125.3	1531
COLORADO	21.5	19.9	21.7	20.2	19.4	19.4	18.7	19.1	18.9	20.3	22.0	23.5	245
CONNECTICUT	25.2	25.1	24.0	21.7	19.7	18.3	18.0	19.1	19.1	21.3	23.3	26.1	261
DELAWARE	7.0	6.9	6.9	6.7	6.6	6.2	6.5	6.5	6.0	6.8	7.2	7.4	81
DIST OF COL	2.2	2.1	2.5	2.2	2.1	2.1	2.1	2.2	2.0	2.2	2.3	2.5	27
FLORIDA	59.0	57.4	60.6	56.3	55.2	55.5	55.2	56.4	53.4	55.3	58.3	61.1	684
GEORGIA	38.7	37.4	40.7	36.8	34.4	34.3	34.6	35.5	33.7	36.3	39.0	39.4	441
IDAHO	8.9	9.2	12.5	12.7	12.2	12.2	12.7	13.2	12.4	14.2	14.8	8.0	143
ILLINOIS	80.2	75.8	77.9	75.8	71.0	68.0	68.2	69.3	67.7	74.1	79.3	85.4	893
INDIANA	50.7	48.2	47.0	41.9	41.3	37.4	37.5	38.0	36.8	40.6	46.3	50.6	516
IOWA	16.0	15.3	16.2	15.1	14.7	15.0	14.0	14.9	15.2	15.0	15.7	18.0	185
KANSAS	16.7	16.5	17.2	16.8	16.3	16.0	16.0	16.5	15.5	16.5	17.5	17.9	200
KENTUCKY	37.8	36.5	38.7	36.4	35.9	35.3	35.3	35.9	35.7	36.9	39.5	39.9	444
LOUISIANA	56.8	55.9	59.9	60.1	61.9	63.8	62.8	63.3	63.4	61.1	60.6	60.9	730
MAINE	16.7	16.8	15.2	12.5	9.7	8.7	8.8	9.3	10.0	11.5	14.2	17.4	151
MARYLAND	30.4	30.5	31.0	28.5	27.5	25.8	26.9	26.8	26.2	29.1	31.6	34.1	348
MASSACHUSETTS	38.8	38.2	38.2	37.0	33.9	33.7	32.2	32.7	34.7	35.5	37.3	41.3	434
MICHIGAN	82.1	78.6	86.4	72.8	69.7	69.0	63.5	64.8	69.3	71.9	79.0	87.5	895
MINNESOTA	40.1	39.2	39.0	35.1	33.1	30.9	29.6	30.6	31.6	34.6	38.9	41.6	424
MISSISSIPPI	60.1	61.2	61.9	60.8	59.5	59.3	59.4	58.0	59.2	59.9	61.3	62.6	723
MISSOURI	57.9	54.1	55.1	48.8	45.8	45.4	44.1	45.3	45.9	49.1	54.5	60.5	607
MONTANA	9.6	8.9	14.4	13.8	12.9	14.8	13.7	13.8	14.3	15.3	15.4	9.8	157
NEBRASKA	12.1	12.5	12.6	11.8	11.9	11.8	11.4	12.0	11.9	12.4	12.2	12.4	145
NEVADA	5.1	6.1	5.8	5.4	6.3	4.7	4.9	6.2	4.6	5.3	7.0	5.0	67
NEW HAMPSHIRE	11.5	10.7	11.2	9.1	7.0	7.5	7.4	6.8	8.2	8.8	9.5	12.3	110
NEW JERSEY	61.8	60.9	59.7	56.2	52.1	50.2	48.4	50.3	50.5	55.1	59.3	64.6	669
NEW MEXICO	16.0	11.1	10.8	11.8	9.6	8.7	10.8	9.9	8.6	12.0	11.0	11.9	132
NEW YORK	103.3	104.9	99.2	88.8	81.3	79.1	76.7	81.9	80.8	88.9	97.3	106.9	1089
NORTH CAROLINA	54.4	55.3	54.8	47.9	44.2	43.6	41.6	43.5	44.2	47.5	54.4	60.5	592
NORTH DAKOTA	3.5	3.8	3.6	3.9	3.4	3.7	3.5	3.3	3.6	3.8	4.1	4.1	44
OHIO	84.6	83.2	82.6	73.7	69.3	66.2	63.0	65.4	64.8	74.2	81.0	86.5	895
OKLAHOMA	29.1	27.6	29.6	26.0	24.7	25.7	24.8	25.0	24.8	26.2	29.2	30.8	324

TABLE A.5 (Cont'd)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
OREGON	24.0	23.0	24.7	23.2	23.0	22.9	22.5	22.9	22.7	24.5	25.0	23.5	282
PENNSYLVANIA	103.4	102.8	99.7	87.3	80.7	76.0	73.5	76.5	77.9	86.9	98.1	106.1	1069
RHODE ISLAND	6.9	7.0	6.9	6.5	5.8	5.5	5.3	5.5	5.9	6.3	6.6	6.9	75
SOUTH CAROLINA	41.0	40.3	41.8	40.9	39.1	40.6	38.4	39.8	39.3	40.7	41.2	43.2	486
SOUTH DAKOTA	4.4	4.3	5.7	5.5	5.4	5.6	5.7	5.7	5.5	6.1	6.1	4.9	65
TENNESSEE	48.7	47.6	48.3	41.2	39.6	40.8	39.6	39.5	41.2	43.6	46.7	52.2	529
TEXAS	166.9	168.7	180.9	176.1	178.5	183.3	179.3	184.3	181.0	182.5	182.0	177.7	2141
UTAH	8.8	9.4	9.0	8.5	9.3	8.3	7.6	9.3	7.8	9.1	11.1	9.5	108
VERMONT	7.0	7.7	6.4	5.1	4.4	3.6	3.4	4.0	3.9	4.8	6.3	7.3	64
VIRGINIA	48.4	46.8	47.0	41.3	38.8	37.7	37.0	38.5	37.2	43.0	46.4	52.3	514
WASHINGTON	33.3	32.1	33.3	32.9	31.7	32.3	31.6	31.2	32.9	33.3	36.8	34.1	395
WEST VIRGINIA	13.9	13.2	14.6	13.9	13.8	12.8	13.0	12.7	13.1	14.4	13.6	14.8	164
WISCONSIN	43.2	41.9	41.9	37.0	35.6	33.6	31.9	32.7	34.3	37.6	40.3	46.0	456
WYOMING	6.0	5.9	6.4	6.0	6.0	5.9	6.0	6.0	5.7	6.2	6.3	6.1	72
NATIONAL TOTALS	1879	1838	1891	1756	1683	1660	1626	1666	1658	1764	1881	1961	21262

TABLE A.6 1986 Total Monthly VOC Emissions by State (10^3 t)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
ALABAMA	29.2	28.0	29.0	27.2	25.2	25.4	26.0	25.6	24.9	26.6	30.1	30.3	328
ARIZONA	13.9	12.7	14.1	13.0	12.1	12.8	12.3	12.3	12.5	12.8	14.1	13.9	157
ARKANSAS	15.0	14.6	14.7	13.2	12.4	12.6	12.5	12.6	12.6	13.1	15.4	15.8	165
CALIFORNIA	125.3	120.2	126.7	128.4	127.4	126.7	127.0	130.3	126.4	128.8	129.3	124.1	1521
COLORADO	20.9	19.4	21.2	19.7	18.9	18.9	18.3	18.6	18.4	19.8	21.4	22.8	239
CONNECTICUT	24.7	24.7	23.4	21.2	19.1	17.8	17.6	18.6	18.6	20.8	22.8	25.6	255
DELAWARE	7.0	6.8	6.8	6.6	6.6	6.1	6.4	6.4	6.1	6.8	7.1	7.2	80
DIST OF COL	2.2	2.1	2.4	2.2	2.0	2.0	2.1	2.1	2.0	2.1	2.3	2.4	26
FLORIDA	57.5	55.9	59.1	54.9	53.7	54.2	54.2	55.1	52.2	54.1	56.9	59.7	667
GEORGIA	37.8	36.5	39.6	35.9	33.4	33.5	33.9	34.6	32.9	35.5	38.1	38.5	430
IDAHO	8.8	9.0	12.4	12.6	12.1	12.1	12.6	13.0	12.3	14.0	14.7	7.9	142
ILLINOIS	78.6	74.4	76.2	74.3	69.3	66.6	67.2	67.9	66.5	72.8	77.7	83.8	875
INDIANA	49.7	47.4	46.0	41.0	40.2	36.4	36.7	37.1	36.0	39.8	45.3	49.6	505
IOWA	15.6	14.9	15.8	14.8	14.3	14.6	13.8	14.6	14.9	14.8	15.4	17.6	181
KANSAS	16.3	16.0	16.9	16.5	15.9	15.7	15.8	16.2	15.3	16.3	17.2	17.5	196
KENTUCKY	37.4	36.1	38.1	36.0	35.4	35.0	35.1	35.5	35.4	36.6	39.0	39.5	439
LOUISIANA	56.7	55.9	59.4	60.3	62.1	64.2	63.3	64.0	64.1	61.4	60.6	60.8	733
MAINE	16.5	16.6	15.1	12.3	9.5	8.5	8.7	9.1	9.8	11.4	14.0	17.2	149
MARYLAND	30.0	30.0	30.3	28.0	27.0	25.4	26.4	26.4	26.1	28.5	30.9	33.4	342
MASSACHUSETTS	37.8	37.3	37.2	36.1	32.9	32.7	31.5	31.8	33.7	34.7	36.4	40.3	423
MICHIGAN	80.3	77.0	84.1	71.1	67.7	67.0	62.1	63.1	67.8	70.3	77.0	85.5	873
MINNESOTA	39.3	38.4	38.2	34.4	32.3	30.2	29.1	30.0	31.0	34.0	38.1	40.8	416
MISSISSIPPI	62.5	62.5	62.0	60.4	58.6	57.8	58.5	56.6	56.8	57.9	59.1	59.9	713
MISSOURI	56.9	53.4	54.0	48.0	44.8	44.5	43.6	44.6	45.1	48.5	53.6	59.6	597
MONTANA	9.5	8.8	14.2	13.8	12.9	14.7	13.6	13.8	14.4	15.2	15.3	9.7	156
NEBRASKA	11.8	12.1	12.2	11.5	11.5	11.4	11.1	11.6	11.6	12.1	11.9	12.1	141
NEVADA	5.0	5.9	5.7	5.2	6.1	4.6	4.9	6.1	4.5	5.2	6.8	4.9	65
NEW HAMPSHIRE	11.3	10.6	11.0	9.0	6.8	7.3	7.2	6.6	8.0	8.6	9.3	12.1	108
NEW JERSEY	60.4	59.5	58.4	54.9	50.7	49.0	47.7	49.2	49.5	54.1	58.0	63.2	655
NEW MEXICO	15.6	10.8	10.7	11.5	9.3	8.6	10.7	9.7	8.5	11.8	10.7	11.7	129
NEW YORK	101.3	103.0	97.1	87.0	79.3	77.1	75.0	79.9	79.2	87.0	95.2	104.8	1066
NORTH CAROLINA	53.4	54.4	53.7	47.0	43.2	42.7	41.0	42.6	43.3	46.8	53.4	59.4	581
NORTH DAKOTA	3.5	3.7	3.5	3.8	3.3	3.6	3.5	3.3	3.5	3.7	4.0	4.0	43
OHIO	82.8	81.7	80.7	72.1	67.5	64.6	61.8	63.9	63.5	72.8	79.3	84.8	875
OKLAHOMA	28.7	27.0	29.0	25.5	24.2	25.3	24.5	24.7	24.7	25.8	28.6	30.2	318

TABLE A.6 (Cont'd)

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
OREGON	23.6	22.5	24.3	22.8	22.6	22.5	22.2	22.5	22.3	24.1	24.6	23.1	277
PENNSYLVANIA	101.6	101.1	97.7	85.6	78.8	74.3	72.2	75.0	76.5	85.5	96.3	104.3	1049
RHODE ISLAND	6.7	6.9	6.7	6.4	5.6	5.4	5.2	5.4	5.7	6.1	6.5	6.8	73
SOUTH CAROLINA	40.1	39.8	40.8	40.2	38.3	39.7	37.8	39.0	38.6	40.1	40.5	42.5	478
SOUTH DAKOTA	4.3	4.2	5.6	5.4	5.3	5.5	5.6	5.6	5.4	5.9	6.0	4.7	64
TENNESSEE	48.0	47.1	47.5	40.7	38.9	40.1	39.1	39.0	40.6	43.1	46.1	51.6	522
TEXAS	165.1	166.7	178.0	174.6	176.7	182.0	178.5	183.4	181.0	181.2	179.8	175.3	2122
UTAH	8.7	9.2	8.8	8.3	9.1	8.1	7.5	9.1	7.7	8.9	10.8	9.3	105
VERMONT	6.9	7.6	6.3	5.0	4.3	3.5	3.3	3.9	3.8	4.8	6.2	7.2	63
VIRGINIA	47.5	46.0	46.0	40.5	37.8	36.9	36.4	37.7	36.4	42.2	45.5	51.3	504
WASHINGTON	32.6	31.5	32.6	32.2	31.1	31.7	31.0	30.6	32.4	32.7	36.0	33.4	388
WEST VIRGINIA	13.7	13.0	14.4	13.6	13.6	12.6	12.8	12.5	12.8	14.1	13.4	14.5	161
WISCONSIN	42.4	41.1	41.0	36.2	34.7	32.7	31.3	32.0	33.5	36.9	39.5	45.0	446
WYOMING	6.0	5.8	6.3	5.9	6.0	5.9	5.9	6.0	5.8	6.1	6.2	6.0	72
NATIONAL TOTALS	1850	1810	1855	1727	1650	1630	1604	1639	1635	1736	1846	1926	20909

APPENDIX B:

GRAPHS OF SO_2, NO_x, AND VOC EMISSIONS BY SEASON FOR FEDERAL REGIONS

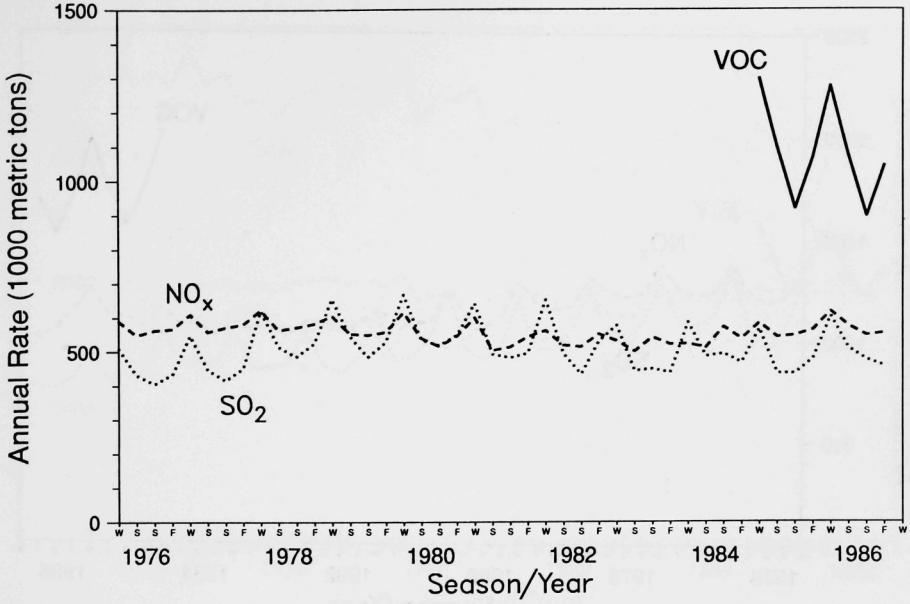

FIGURE B.1 Total Seasonal SO_2, NO_x, and VOC Emissions for Region I

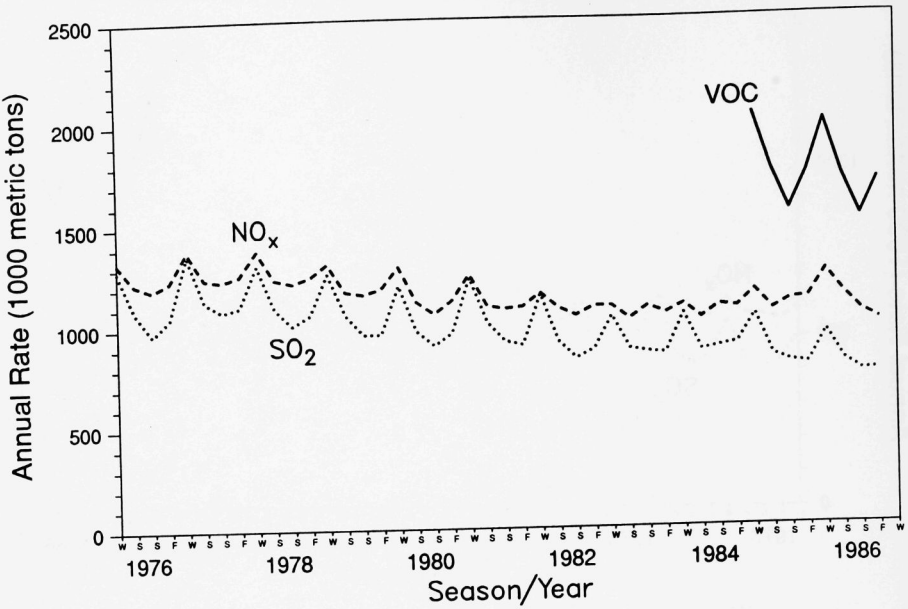

FIGURE B.2 Total Seasonal SO_2, NO_x, and VOC Emissions for Region II

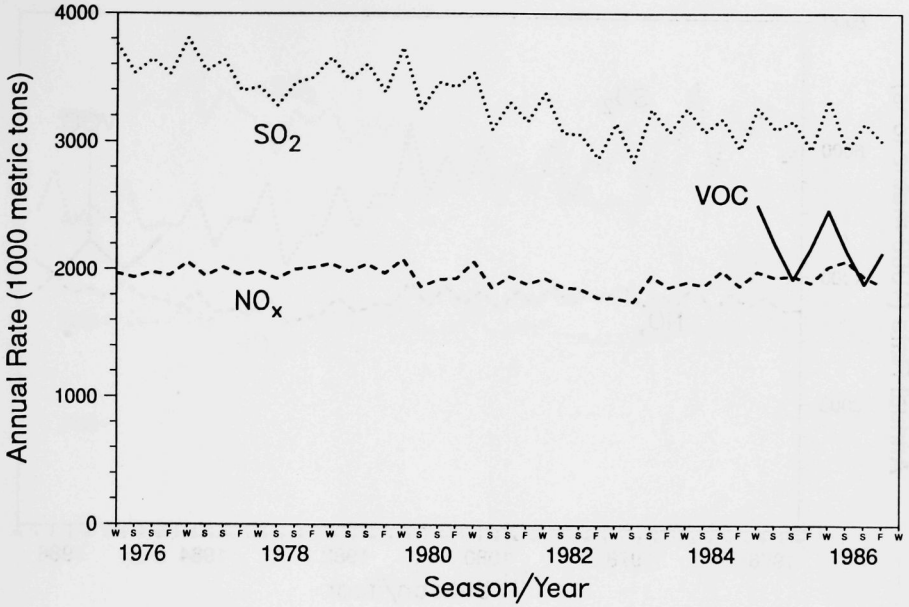

FIGURE B.3 Total Seasonal SO_2, NO_x, and VOC Emissions for Region III

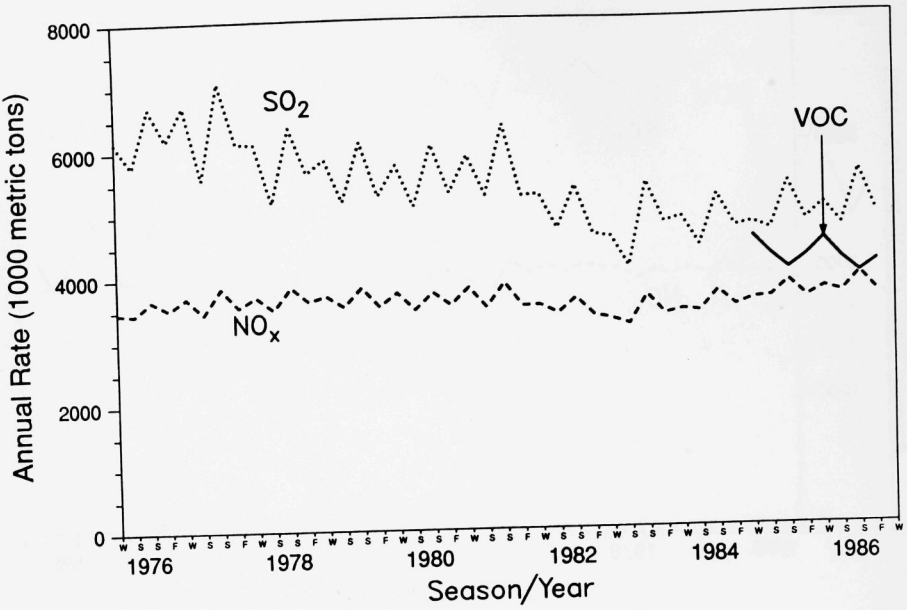

FIGURE B.4 Total Seasonal SO_2, NO_x, and VOC Emissions for Region IV

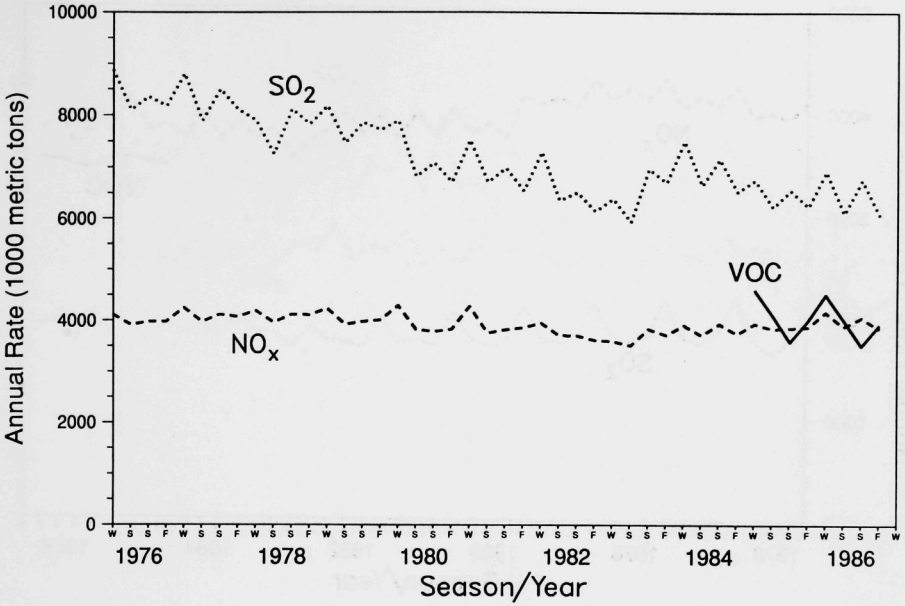

FIGURE B.5 Total Seasonal SO_2, NO_x, and VOC Emissions for Region V

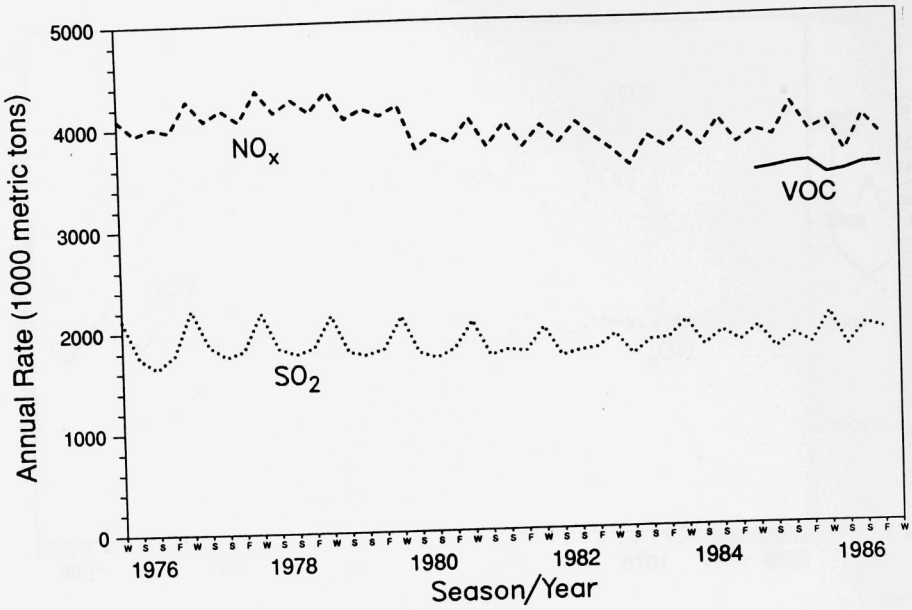

FIGURE B.6 Total Seasonal SO_2, NO_x, and VOC Emissions for Region VI

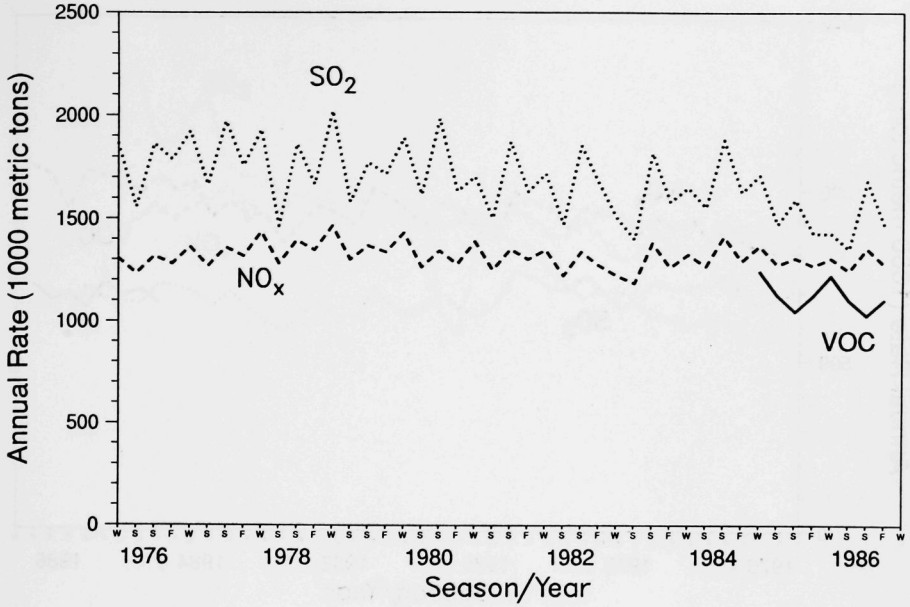

FIGURE B.7 Total Seasonal SO_2, NO_x, and VOC Emissions for Region VII

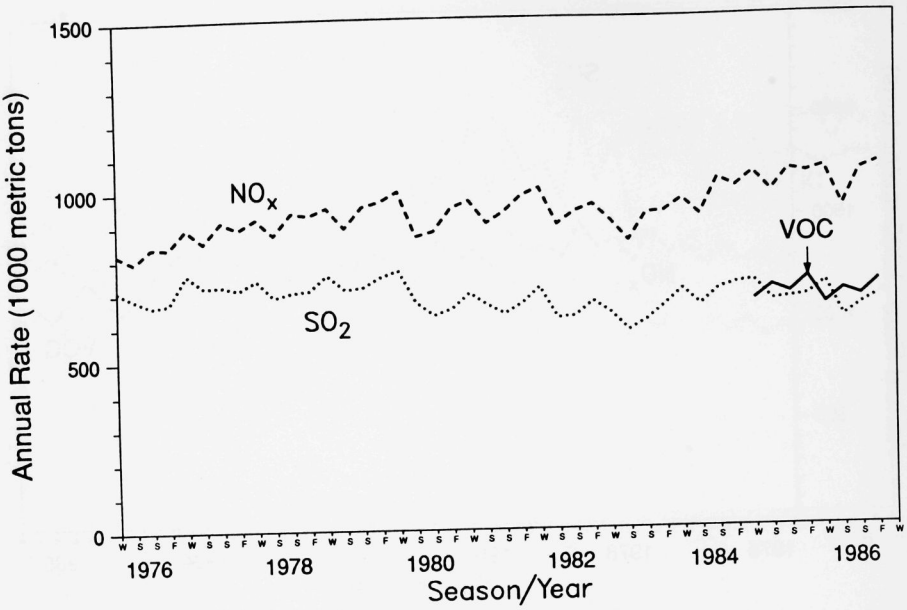

FIGURE B.8 Total Seasonal SO_2, NO_x, and VOC Emissions for Region VIII

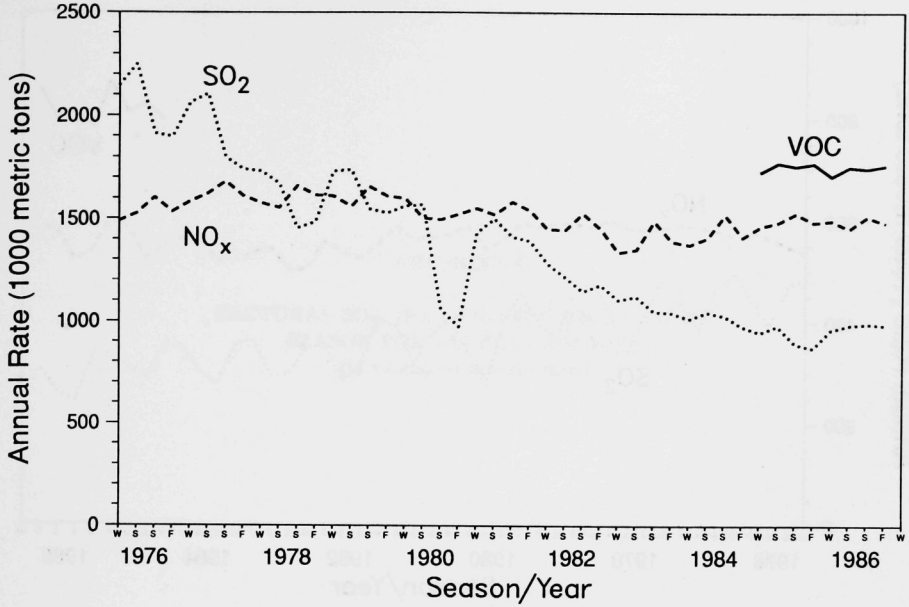

FIGURE B.9 Total Seasonal SO_2, NO_x, and VOC Emissions for Region IX

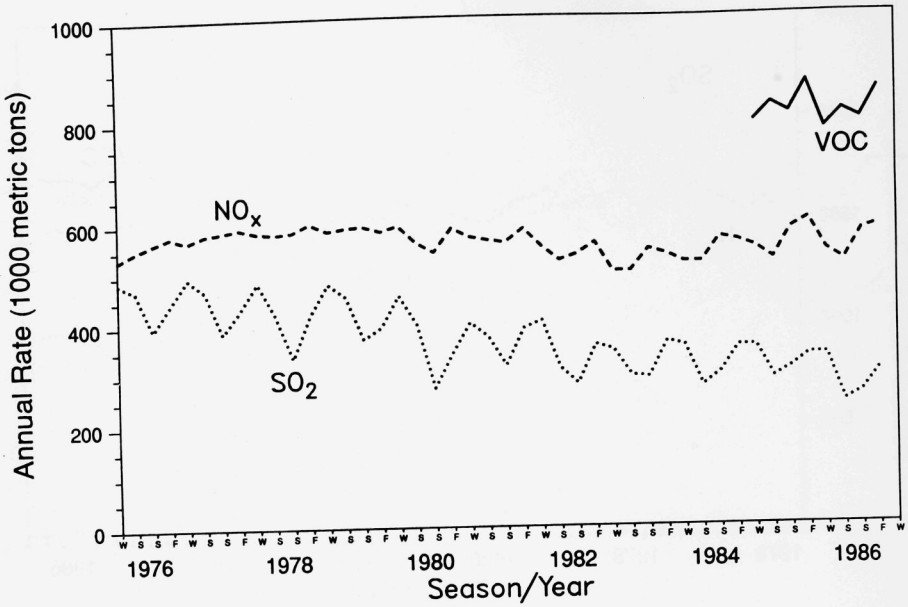

FIGURE B.10 Total Seasonal SO_2, NO_x, and VOC Emissions for Region X

APPENDIX C:

SECTORAL SO_2, NO_x, AND VOC EMISSIONS BY SEASON FOR FEDERAL REGIONS
(in thousand metric tons)

APPENDIX C:

SO_2, NO_x, AND VOC EMISSIONS BY SEASON, SECTOR, AND FEDERAL REGION

Note to user: This report defines winter differently than our previous report (Ref. 1, *Estimated Monthly Emissions of Sulfur Dioxide and Oxides of Nitrogen for the 48 Contiguous States, 1975-1984*). For this reason, the totals for winter will be different than those in Ref. 1. The new definition uses December of the previous year to get a total for winter in the current year (i.e., Winter - Dec_{y-1} + Jan_y + Feb_y). In addition, this change will cause the annual emissions for a given year to be different from the sum of the seasonal emissions. For this reason, we have included annual totals as well as seasonal totals.

C.1 SO_2 EMISSIONS

TABLE C.1 1975 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN75-DEC75	WINTER DEC74-FEB75	SPRING MAR75-MAY75	SUMMER JUN75-AUG75	FALL SEP75-NOV75
REGION 1						
	UTILITY	203.5	39.3	45.7	52.6	46.1
	IND FUEL COMB	92.0	15.3	22.8	22.8	23.3
	COM/INST/RES	45.1	13.1	11.6	4.0	9.8
	IND PROC	12.7	1.9	3.2	3.4	3.3
	MISCELLANEOUS	44.6	9.4	11.3	8.7	10.7
	TOTAL	398.0	78.9	94.6	91.5	93.2
REGION 2						
	UTILITY	588.8	99.2	140.4	156.6	139.6
	IND FUEL COMB	170.2	28.6	42.5	42.2	42.8
	COM/INST/RES	170.3	49.0	43.3	15.6	37.8
	IND PROC	61.6	8.4	15.4	17.1	16.3
	MISCELLANEOUS	78.3	17.3	19.6	14.0	18.7
	TOTAL	1069.2	202.4	261.3	245.5	255.2
REGION 3						
	UTILITY	2723.2	475.8	647.2	700.9	654.5
	IND FUEL COMB	355.9	60.0	89.2	88.0	89.2
	COM/INST/RES	99.1	27.0	23.3	11.4	23.9
	IND PROC	328.0	53.4	87.4	82.3	80.4
	MISCELLANEOUS	87.2	17.5	21.8	17.9	21.3
	TOTAL	3593.4	633.7	868.9	900.5	869.3
REGION 4						
	UTILITY	4518.3	685.8	1035.2	1246.1	1138.4
	IND FUEL COMB	609.2	101.9	151.8	151.1	153.6
	COM/INST/RES	107.0	32.6	23.7	10.7	22.2
	IND PROC	425.6	66.7	109.5	108.9	107.5
	MISCELLANEOUS	117.6	21.3	29.1	27.5	28.9
	TOTAL	5777.8	908.3	1349.3	1544.3	1450.6
REGION 5						
	UTILITY	6781.2	1145.4	1585.8	1815.4	1626.2
	IND FUEL COMB	818.3	138.2	205.2	202.2	205.1
	COM/INST/RES	158.1	40.0	38.3	21.3	38.8
	IND PROC	596.3	95.9	159.8	149.6	145.8
	MISCELLANEOUS	105.0	19.3	26.4	23.9	25.8
	TOTAL	8458.9	1438.8	2015.5	2212.4	2041.7
REGION 6						
	UTILITY	179.9	29.0	35.9	50.6	42.9
	IND FUEL COMB	269.6	45.1	67.4	67.0	67.7
	COM/INST/RES	279.1	95.9	57.7	18.1	56.0
	IND PROC	905.8	145.9	235.3	227.0	224.1
	MISCELLANEOUS	81.3	13.6	20.3	20.3	20.3
	TOTAL	1715.7	329.5	416.5	383.0	411.1

TABLE C.1 (Cont'd)

		ANNUAL JAN75-DEC75	WINTER DEC74-FEB75	SPRING MAR75-MAY75	SUMMER JUN75-AUG75	FALL SEP75-NOV75
REGION 7						
	UTILITY	1323.2	246.0	275.9	355.5	317.9
	IND FUEL COMB	128.9	21.6	32.2	32.1	32.3
	COM/INST/RES	24.6	5.8	5.0	3.7	6.6
	IND PROC	135.8	19.1	33.8	37.1	35.8
	MISCELLANEOUS	27.1	4.7	6.8	6.5	6.7
	TOTAL	1639.6	297.1	353.7	434.9	399.3
REGION 8						
	UTILITY	198.5	34.2	43.7	48.2	50.7
	IND FUEL COMB	104.7	17.5	26.2	26.1	26.2
	COM/INST/RES	35.8	8.0	9.2	5.8	8.6
	IND PROC	272.6	44.8	73.7	66.6	65.2
	MISCELLANEOUS	23.6	4.1	5.9	5.6	5.9
	TOTAL	635.2	108.7	158.8	152.2	156.6
REGION 9						
	UTILITY	188.6	38.4	44.8	40.6	46.0
	IND FUEL COMB	86.7	14.6	21.7	21.5	21.7
	COM/INST/RES	25.3	6.8	6.6	3.6	5.5
	IND PROC	1708.2	297.7	485.2	393.7	386.6
	MISCELLANEOUS	57.3	9.6	14.3	14.3	14.3
	TOTAL	2066.0	367.0	572.5	473.6	474.1
REGION 10						
	UTILITY	32.5	5.5	5.8	8.1	10.5
	IND FUEL COMB	45.1	7.5	11.2	11.2	11.4
	COM/INST/RES	46.5	13.1	10.6	6.0	11.0
	IND PROC	293.8	50.6	82.1	68.8	67.5
	MISCELLANEOUS	24.5	4.5	6.1	5.6	6.1
	TOTAL	442.4	81.2	115.8	99.7	106.4
REGION TOTALS						
	UTILITY	16737.8	2798.4	3860.4	4474.6	4072.7
	IND FUEL COMB	2680.5	450.4	670.2	664.2	673.4
	COM/INST/RES	990.9	291.2	229.3	100.1	220.2
	IND PROC	4740.5	784.3	1285.5	1154.3	1132.6
	MISCELLANEOUS	646.6	121.2	161.6	144.4	158.6
	TOTAL	25796.2	4445.6	6206.9	6537.6	6257.4

TABLE C.2 1976 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN76-DEC76	WINTER DEC75-FEB76	SPRING MAR76-MAY76	SUMMER JUN76-AUG76	FALL SEP76-NOV76
REGION 1						
	UTILITY	225.6	61.9	51.3	56.1	53.9
	IND FUEL COMB	110.2	26.1	27.3	27.4	27.9
	COM/INST/RES	50.8	21.4	13.1	4.4	11.0
	IND PROC	13.8	2.9	3.5	3.7	3.6
	MISCELLANEOUS	49.6	15.1	12.5	9.6	11.8
	TOTAL	450.0	127.4	107.7	101.2	108.3
REGION 2						
	UTILITY	570.7	155.1	137.2	144.6	134.9
	IND FUEL COMB	189.6	45.9	47.4	47.0	47.7
	COM/INST/RES	192.3	80.2	48.9	17.3	42.6
	IND PROC	62.9	12.8	15.7	17.6	16.7
	MISCELLANEOUS	87.0	27.9	21.8	15.5	20.8
	TOTAL	1102.5	321.9	271.0	242.0	262.7
REGION 3						
	UTILITY	2740.0	703.8	660.2	711.3	665.6
	IND FUEL COMB	347.1	87.9	87.0	85.8	87.0
	COM/INST/RES	107.1	43.0	25.3	11.8	25.6
	IND PROC	323.3	76.7	85.9	81.5	79.6
	MISCELLANEOUS	96.9	28.2	24.2	19.9	23.6
	TOTAL	3614.4	939.7	882.5	910.3	881.5
REGION 4						
	UTILITY	4933.9	1196.4	1118.4	1368.0	1221.2
	IND FUEL COMB	635.7	157.1	158.4	157.7	160.3
	COM/INST/RES	117.4	54.3	25.8	11.3	24.0
	IND PROC	412.8	97.2	106.1	106.2	104.7
	MISCELLANEOUS	130.7	34.4	32.4	30.6	32.1
	TOTAL	6230.5	1539.5	1441.0	1673.7	1542.3
REGION 5						
	UTILITY	6737.3	1791.0	1607.9	1703.1	1639.9
	IND FUEL COMB	758.3	195.7	190.2	187.4	190.0
	COM/INST/RES	162.3	61.3	39.5	21.2	39.4
	IND PROC	589.8	139.2	157.5	148.8	144.9
	MISCELLANEOUS	116.7	31.1	29.3	26.6	28.7
	TOTAL	8364.3	2218.3	2024.3	2087.1	2043.0
REGION 6						
	UTILITY	258.9	63.7	47.7	73.9	67.9
	IND FUEL COMB	301.9	72.9	75.5	75.0	75.8
	COM/INST/RES	317.8	160.7	65.7	20.5	63.7
	IND PROC	863.8	211.8	224.3	217.4	214.2
	MISCELLANEOUS	90.3	21.9	22.6	22.5	22.6
	TOTAL	1832.9	531.1	435.7	409.4	444.1

TABLE C.2 (Cont'd)

		ANNUAL JAN76-DEC76	WINTER DEC75-FEB76	SPRING MAR76-MAY76	SUMMER JUN76-AUG76	FALL SEP76-NOV76
REGION 7						
	UTILITY	1460.6	388.7	311.0	386.1	365.2
	IND FUEL COMB	118.0	30.5	29.4	29.4	29.6
	COM/INST/RES	25.8	9.8	5.3	3.7	6.8
	IND PROC	142.4	29.9	35.5	39.0	37.6
	MISCELLANEOUS	30.1	7.6	7.5	7.2	7.5
	TOTAL	1776.9	466.4	388.7	465.4	446.7
REGION 8						
	UTILITY	249.2	65.5	56.0	61.6	61.3
	IND FUEL COMB	108.7	26.9	27.2	27.1	27.2
	COM/INST/RES	37.7	12.7	9.8	5.8	9.0
	IND PROC	266.1	65.8	71.8	65.3	63.8
	MISCELLANEOUS	26.2	6.6	6.6	6.3	6.5
	TOTAL	687.9	177.6	171.4	166.0	167.9
REGION 9						
	UTILITY	230.4	56.9	50.8	57.2	57.5
	IND FUEL COMB	99.5	23.9	24.9	24.7	24.9
	COM/INST/RES	28.7	10.6	7.4	4.0	6.2
	IND PROC	1631.7	429.3	463.3	376.3	369.4
	MISCELLANEOUS	63.6	15.4	15.9	15.9	15.9
	TOTAL	2053.9	536.2	562.4	478.1	474.0
REGION 10						
	UTILITY	34.6	7.4	6.3	5.4	13.1
	IND FUEL COMB	51.6	12.4	12.8	12.8	13.0
	COM/INST/RES	51.8	20.5	11.9	6.5	12.2
	IND PROC	286.7	74.1	80.0	67.3	66.0
	MISCELLANEOUS	27.3	7.2	6.8	6.3	6.8
	TOTAL	452.0	121.7	117.7	98.4	111.1
REGION TOTALS						
	UTILITY	17441.1	4490.6	4046.7	4567.4	4280.5
	IND FUEL COMB	2720.7	679.4	680.2	674.3	683.5
	COM/INST/RES	1091.7	474.6	252.7	106.6	240.6
	IND PROC	4593.3	1139.7	1243.5	1123.0	1100.6
	MISCELLANEOUS	718.4	195.5	179.5	160.4	176.2
	TOTAL	26565.3	6979.8	6402.5	6631.7	6481.5

TABLE C.3 1977 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN77-DEC77	WINTER DEC76-FEB77	SPRING MAR77-MAY77	SUMMER JUN77-AUG77	FALL SEP77-NOV77
REGION 1						
	UTILITY	231.4	66.4	52.1	55.5	55.2
	IND FUEL COMB	121.1	29.4	30.0	30.1	30.7
	COM/INST/RES	49.7	21.9	12.8	4.3	10.8
	IND PROC	13.5	2.9	3.4	3.6	3.6
	MISCELLANEOUS	52.1	16.1	13.1	10.1	12.4
	TOTAL	467.7	136.8	111.5	103.7	112.7
REGION 2						
	UTILITY	617.3	164.4	144.0	167.1	142.7
	IND FUEL COMB	202.8	49.8	50.6	50.3	51.0
	COM/INST/RES	188.0	82.2	47.8	17.0	41.6
	IND PROC	68.1	13.5	17.0	19.1	18.2
	MISCELLANEOUS	91.3	29.8	22.9	16.3	21.8
	TOTAL	1167.5	339.6	282.3	269.8	275.3
REGION 3						
	UTILITY	2680.3	712.2	660.4	705.3	627.7
	IND FUEL COMB	349.6	87.6	87.7	86.5	87.7
	COM/INST/RES	105.3	43.8	24.8	11.7	25.2
	IND PROC	335.2	77.8	88.8	84.9	82.8
	MISCELLANEOUS	101.8	30.2	25.4	20.9	24.8
	TOTAL	3572.2	951.6	887.1	909.2	848.2
REGION 4						
	UTILITY	4992.6	1324.2	1056.0	1451.1	1195.3
	IND FUEL COMB	657.8	163.0	163.8	163.2	165.9
	COM/INST/RES	115.2	55.6	25.3	11.1	23.6
	IND PROC	426.2	97.4	109.4	110.1	108.4
	MISCELLANEOUS	137.2	36.8	34.0	32.1	33.7
	TOTAL	6329.0	1676.9	1388.5	1767.7	1526.9
REGION 5						
	UTILITY	6660.9	1777.9	1556.3	1739.2	1621.3
	IND FUEL COMB	741.3	187.9	186.0	183.2	185.7
	COM/INST/RES	160.6	61.6	39.0	21.1	39.1
	IND PROC	598.8	138.9	159.1	152.3	148.0
	MISCELLANEOUS	122.5	33.2	30.8	27.9	30.1
	TOTAL	8284.2	2199.6	1971.2	2123.6	2024.3
REGION 6						
	UTILITY	332.2	82.9	77.2	99.0	73.5
	IND FUEL COMB	306.1	76.3	76.5	76.1	76.9
	COM/INST/RES	310.1	165.2	64.1	20.1	62.1
	IND PROC	861.7	206.3	222.7	218.4	214.9
	MISCELLANEOUS	94.9	23.4	23.7	23.6	23.7
	TOTAL	1904.9	554.1	464.2	437.1	451.1

TABLE C.3 (Cont'd)

		ANNUAL JAN77-DEC77	WINTER DEC76-FEB77	SPRING MAR77-MAY77	SUMMER JUN77-AUG77	FALL SEP77-NOV77
REGION 7						
	UTILITY	1516.5	402.9	337.1	411.7	356.3
	IND FUEL COMB	115.9	29.2	28.9	28.8	29.1
	COM/INST/RES	25.4	9.9	5.3	3.6	6.7
	IND PROC	147.4	30.5	36.7	40.8	39.2
	MISCELLANEOUS	31.6	8.1	7.9	7.6	7.8
	TOTAL	1836.9	480.6	415.8	492.6	439.2
REGION 8						
	UTILITY	303.1	79.7	68.3	78.5	73.4
	IND FUEL COMB	111.0	27.6	27.8	27.6	27.7
	COM/INST/RES	37.1	12.9	9.6	5.8	8.9
	IND PROC	255.3	62.9	68.4	63.2	61.8
	MISCELLANEOUS	21.7	6.1	5.5	5.1	5.4
	TOTAL	728.3	189.2	179.6	180.3	177.3
REGION 9						
	UTILITY	244.9	70.3	62.8	65.0	54.1
	IND FUEL COMB	106.3	26.1	26.6	26.3	26.7
	COM/INST/RES	28.0	10.8	7.3	4.0	6.1
	IND PROC	1458.2	392.1	412.9	337.1	331.0
	MISCELLANEOUS	66.8	16.5	16.7	16.7	16.7
	TOTAL	1904.3	515.8	526.3	449.1	434.6
REGION 10						
	UTILITY	50.4	13.1	12.9	8.9	15.2
	IND FUEL COMB	54.5	13.4	13.5	13.5	13.8
	COM/INST/RES	50.7	20.9	11.6	6.4	11.9
	IND PROC	258.7	68.4	71.9	61.0	59.8
	MISCELLANEOUS	28.6	7.7	7.1	6.6	7.1
	TOTAL	442.9	123.6	117.1	96.4	107.8
REGION TOTALS						
	UTILITY	17629.6	4693.8	4027.2	4781.1	4214.7
	IND FUEL COMB	2766.4	690.4	691.5	685.6	695.1
	COM/INST/RES	1070.2	484.8	247.7	105.1	236.2
	IND PROC	4423.1	1090.9	1190.4	1090.5	1067.7
	MISCELLANEOUS	748.6	208.0	187.1	167.0	183.6
	TOTAL	26637.9	7167.9	6343.8	6829.3	6397.3

TABLE C.4 1978 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN78-DEC78	WINTER DEC77-FEB78	SPRING MAR78-MAY78	SUMMER JUN78-AUG78	FALL SEP78-NOV78
REGION 1						
	UTILITY	313.5	85.7	71.6	74.9	75.8
	IND FUEL COMB	111.1	28.7	27.5	27.6	28.1
	COM/INST/RES	46.3	20.7	11.9	4.2	10.1
	IND PROC	13.9	3.0	3.5	3.7	3.7
	MISCELLANEOUS	55.2	17.0	13.9	10.7	13.2
	TOTAL	540.0	155.0	128.5	121.1	130.9
REGION 2						
	UTILITY	578.0	154.9	138.7	151.0	135.4
	IND FUEL COMB	191.0	48.9	47.7	47.3	48.0
	COM/INST/RES	175.3	77.5	44.6	16.4	38.9
	IND PROC	71.3	14.2	17.8	20.1	19.1
	MISCELLANEOUS	96.8	31.5	24.3	17.3	23.1
	TOTAL	1112.4	327.0	273.0	252.1	264.6
REGION 3						
	UTILITY	2531.0	615.3	591.9	657.3	651.7
	IND FUEL COMB	349.2	87.8	87.5	86.3	87.6
	COM/INST/RES	103.6	42.6	24.2	12.2	25.1
	IND PROC	335.0	78.2	88.5	85.2	83.1
	MISCELLANEOUS	107.8	31.9	26.9	22.1	26.3
	TOTAL	3426.5	855.8	819.1	863.2	873.7
REGION 4						
	UTILITY	4424.6	1170.1	958.9	1268.9	1073.2
	IND FUEL COMB	639.1	161.7	159.2	158.6	161.2
	COM/INST/RES	111.3	53.1	24.7	11.4	23.2
	IND PROC	435.3	99.3	111.5	112.9	111.0
	MISCELLANEOUS	145.4	38.9	36.0	34.0	35.7
	TOTAL	5755.7	1523.1	1290.3	1585.7	1404.3
REGION 5						
	UTILITY	6104.7	1549.7	1393.5	1635.8	1545.2
	IND FUEL COMB	761.7	189.9	191.0	188.2	190.8
	COM/INST/RES	168.6	62.7	40.9	23.0	41.5
	IND PROC	584.2	135.9	154.4	149.8	145.5
	MISCELLANEOUS	129.8	35.1	32.6	29.6	31.9
	TOTAL	7749.0	1973.2	1812.4	2026.5	1955.0
REGION 6						
	UTILITY	362.3	87.5	79.0	106.6	84.8
	IND FUEL COMB	300.1	75.6	75.0	74.6	75.4
	COM/INST/RES	284.9	154.9	58.8	18.5	57.3
	IND PROC	846.9	202.2	217.5	216.2	212.6
	MISCELLANEOUS	100.5	24.8	25.1	25.1	25.1
	TOTAL	1894.6	544.9	455.5	440.9	455.1

TABLE C.4 (Cont'd)

	ANNUAL JAN78-DEC78	WINTER DEC77-FEB78	SPRING MAR78-MAY78	SUMMER JUN78-AUG78	FALL SEP78-NOV78
REGION 7					
UTILITY	1388.9	402.8	283.1	380.2	329.7
IND FUEL COMB	118.8	29.5	29.6	29.6	29.8
COM/INST/RES	26.1	9.7	5.3	4.0	7.1
IND PROC	157.2	32.0	39.1	43.6	41.8
MISCELLANEOUS	33.5	8.6	8.4	8.1	8.3
TOTAL	1724.4	482.6	365.5	465.4	416.7
REGION 8					
UTILITY	302.6	80.5	66.9	77.6	77.0
IND FUEL COMB	109.0	27.5	27.3	27.2	27.2
COM/INST/RES	37.7	12.7	9.7	6.2	9.1
IND PROC	233.7	57.8	61.9	58.6	57.2
MISCELLANEOUS	23.0	5.9	5.8	5.5	5.7
TOTAL	706.0	184.4	171.7	175.1	176.3
REGION 9					
UTILITY	186.7	50.7	34.9	42.7	52.8
IND FUEL COMB	99.9	25.6	25.0	24.8	25.1
COM/INST/RES	26.0	10.1	6.7	3.7	5.7
IND PROC	1180.8	328.3	332.9	274.1	269.3
MISCELLANEOUS	70.8	17.4	17.7	17.7	17.7
TOTAL	1564.2	432.2	417.2	362.9	370.5
REGION 10					
UTILITY	65.3	20.9	13.6	5.4	22.0
IND FUEL COMB	51.7	13.2	12.9	12.9	13.1
COM/INST/RES	47.9	19.9	10.9	6.2	11.3
IND PROC	219.5	59.1	60.5	52.1	51.2
MISCELLANEOUS	30.3	8.1	7.5	7.0	7.5
TOTAL	414.7	121.2	105.4	83.6	105.0
REGION TOTALS					
UTILITY	16257.5	4218.0	3632.0	4400.5	4047.7
IND FUEL COMB	2731.5	688.4	682.8	676.9	686.3
COM/INST/RES	1027.6	463.8	237.8	105.7	229.2
IND PROC	4077.8	1010.0	1087.7	1016.4	994.4
MISCELLANEOUS	793.1	219.3	198.2	176.9	194.5
TOTAL	24887.6	6599.5	5838.5	6376.5	6152.1

TABLE C.5 1979 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN79-DEC79	WINTER DEC78-FEB79	SPRING MAR79-MAY79	SUMMER JUN79-AUG79	FALL SEP79-NOV79
REGION 1						
	UTILITY	346.0	99.6	84.7	78.8	81.9
	IND FUEL COMB	94.0	25.0	23.3	23.4	23.8
	COM/INST/RES	38.1	17.8	9.8	3.4	8.3
	IND PROC	13.9	3.0	3.5	3.7	3.7
	MISCELLANEOUS	59.5	18.3	15.0	11.5	14.2
	TOTAL	551.6	163.6	136.3	120.9	131.9
REGION 2						
	UTILITY	558.6	155.9	141.0	145.8	120.8
	IND FUEL COMB	171.1	44.6	42.7	42.4	43.0
	COM/INST/RES	143.9	66.5	36.6	13.4	31.9
	IND PROC	70.9	14.3	17.7	20.0	19.0
	MISCELLANEOUS	104.4	33.8	26.2	18.7	24.9
	TOTAL	1049.0	315.1	264.2	240.2	239.7
REGION 3						
	UTILITY	2642.2	675.1	643.2	693.6	624.9
	IND FUEL COMB	348.1	87.6	87.3	86.1	87.3
	COM/INST/RES	85.4	37.1	20.0	10.0	20.7
	IND PROC	338.2	78.8	89.5	85.9	83.8
	MISCELLANEOUS	116.3	34.2	29.0	23.9	28.3
	TOTAL	3530.2	912.8	869.0	899.5	845.0
REGION 4						
	UTILITY	4268.4	1114.4	968.1	1213.4	988.2
	IND FUEL COMB	605.5	154.6	150.9	150.2	152.7
	COM/INST/RES	91.6	46.1	20.3	9.3	19.1
	IND PROC	437.6	100.3	112.2	113.4	111.5
	MISCELLANEOUS	156.8	41.7	38.9	36.7	38.6
	TOTAL	5559.9	1457.1	1290.2	1523.1	1310.1
REGION 5						
	UTILITY	6128.4	1615.1	1441.7	1564.9	1513.0
	IND FUEL COMB	793.8	197.0	199.1	196.2	198.9
	COM/INST/RES	139.3	55.9	33.8	19.0	34.3
	IND PROC	591.6	135.8	156.6	151.5	147.1
	MISCELLANEOUS	140.1	37.6	35.1	31.9	34.4
	TOTAL	7793.2	2041.4	1866.3	1963.4	1927.7
REGION 6						
	UTILITY	371.1	99.6	76.9	104.2	88.8
	IND FUEL COMB	279.2	71.6	69.8	69.4	70.1
	COM/INST/RES	234.6	133.0	48.5	15.2	47.2
	IND PROC	860.6	203.0	221.2	219.4	215.8
	MISCELLANEOUS	108.4	26.6	27.1	27.0	27.1
	TOTAL	1853.9	533.7	443.5	435.2	449.0

TABLE C.5 (Cont'd)

		ANNUAL JAN79-DEC79	WINTER DEC78-FEB79	SPRING MAR79-MAY79	SUMMER JUN79-AUG79	FALL SEP79-NOV79
REGION 7						
	UTILITY	1407.4	422.9	310.3	355.0	339.8
	IND FUEL COMB	124.1	30.7	31.0	30.9	31.2
	COM/INST/RES	21.5	8.7	4.4	3.3	5.8
	IND PROC	164.4	33.9	40.9	45.3	43.6
	MISCELLANEOUS	36.1	9.2	9.0	8.7	9.0
	TOTAL	1753.6	505.4	395.6	443.2	429.4
REGION 8						
	UTILITY	324.5	85.5	71.1	79.5	85.6
	IND FUEL COMB	104.6	26.6	26.2	26.0	26.1
	COM/INST/RES	31.2	11.2	8.0	5.1	7.5
	IND PROC	239.2	56.8	63.5	59.9	58.5
	MISCELLANEOUS	31.4	7.5	7.9	7.5	7.8
	TOTAL	730.9	187.6	176.8	178.1	185.5
REGION 9						
	UTILITY	215.7	68.2	39.5	56.7	55.0
	IND FUEL COMB	88.3	23.2	22.1	21.9	22.1
	COM/INST/RES	21.3	8.6	5.5	3.0	4.6
	IND PROC	1232.8	313.7	348.0	285.9	280.8
	MISCELLANEOUS	76.4	18.7	19.1	19.0	19.1
	TOTAL	1634.5	432.4	434.2	386.5	381.7
REGION 10						
	UTILITY	74.7	24.3	21.2	13.7	15.3
	IND FUEL COMB	46.2	12.0	11.5	11.5	11.7
	COM/INST/RES	39.5	17.1	9.0	5.1	9.3
	IND PROC	231.8	57.8	63.9	55.0	54.0
	MISCELLANEOUS	32.7	8.7	8.1	7.5	8.1
	TOTAL	424.9	120.1	113.7	92.8	98.4
REGION TOTALS						
	UTILITY	16337.1	4360.6	3797.7	4305.6	3913.3
	IND FUEL COMB	2655.1	672.7	663.8	657.9	667.0
	COM/INST/RES	846.4	402.1	195.9	86.9	188.8
	IND PROC	4180.9	997.4	1117.0	1040.1	1017.8
	MISCELLANEOUS	862.1	236.3	215.4	192.5	211.5
	TOTAL	24881.6	6669.1	5989.8	6283.0	5998.3

TABLE C.6 1980 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN80-DEC80	WINTER DEC79-FEB80	SPRING MAR80-MAY80	SUMMER JUN80-AUG80	FALL SEP80-NOV80
REGION 1						
	UTILITY	366.9	103.8	82.1	89.4	87.6
	IND FUEL COMB	87.2	22.9	21.6	21.0	22.1
	COM/INST/RES	41.6	17.7	10.7	3.5	9.0
	IND PROC	14.2	3.1	3.6	3.7	3.7
	MISCELLANEOUS	62.0	19.2	15.7	12.0	14.8
	TOTAL	571.9	166.8	133.7	129.7	137.2
REGION 2						
	UTILITY	529.3	141.7	120.7	137.7	122.7
	IND FUEL COMB	155.6	41.6	39.0	36.4	39.1
	COM/INST/RES	158.0	66.5	40.2	14.1	35.0
	IND PROC	66.2	14.3	16.2	17.9	17.8
	MISCELLANEOUS	108.7	35.6	27.3	19.4	26.0
	TOTAL	1017.7	299.7	243.3	225.5	240.6
REGION 3						
	UTILITY	2636.9	701.1	604.6	688.6	650.7
	IND FUEL COMB	305.4	83.2	76.9	70.4	76.7
	COM/INST/RES	84.8	35.2	20.1	9.0	20.2
	IND PROC	311.1	77.6	81.5	71.9	78.9
	MISCELLANEOUS	121.1	36.0	30.2	24.9	29.5
	TOTAL	3459.3	933.1	813.4	864.8	856.0
REGION 4						
	UTILITY	4327.5	1094.7	964.4	1227.7	1013.9
	IND FUEL COMB	540.5	145.0	134.9	127.5	136.4
	COM/INST/RES	94.2	44.9	20.6	8.8	19.0
	IND PROC	420.4	101.2	107.0	103.9	107.2
	MISCELLANEOUS	163.4	43.9	40.5	38.2	40.2
	TOTAL	5546.0	1429.7	1267.4	1506.1	1316.8
REGION 5						
	UTILITY	5601.5	1563.2	1322.7	1439.9	1309.7
	IND FUEL COMB	686.8	187.8	173.1	158.9	172.3
	COM/INST/RES	122.5	49.0	29.9	15.5	29.5
	IND PROC	527.9	132.4	141.4	123.5	130.3
	MISCELLANEOUS	145.9	39.6	36.6	33.2	35.9
	TOTAL	7084.5	1972.1	1703.6	1771.1	1677.7
REGION 6						
	UTILITY	438.2	99.0	87.6	131.9	115.0
	IND FUEL COMB	252.7	67.8	63.5	59.6	63.1
	COM/INST/RES	262.3	133.5	54.3	17.0	52.5
	IND PROC	774.6	199.4	204.7	187.6	186.3
	MISCELLANEOUS	112.9	28.0	28.2	28.1	28.2
	TOTAL	1840.8	527.8	438.3	424.2	445.0

TABLE C.6 (Cont'd)

		ANNUAL JAN80-DEC80	WINTER DEC79-FEB80	SPRING MAR80-MAY80	SUMMER JUN80-AUG80	FALL SEP80-NOV80
REGION 7						
	UTILITY	1470.7	394.3	330.1	422.3	331.1
	IND FUEL COMB	107.2	29.1	26.9	25.6	26.7
	COM/INST/RES	19.9	8.0	4.2	2.7	5.2
	IND PROC	137.5	31.8	34.0	36.5	36.6
	MISCELLANEOUS	37.6	9.7	9.4	9.1	9.3
	TOTAL	1772.9	472.9	404.5	496.1	408.9
REGION 8						
	UTILITY	325.3	94.0	72.7	78.6	81.6
	IND FUEL COMB	93.1	24.6	23.4	22.6	23.2
	COM/INST/RES	29.1	10.3	7.6	4.3	7.0
	IND PROC	197.2	53.9	56.4	45.5	43.4
	MISCELLANEOUS	25.8	7.3	6.5	6.1	6.4
	TOTAL	670.6	190.1	166.6	157.1	161.6
REGION 9						
	UTILITY	176.7	51.4	42.6	45.5	42.3
	IND FUEL COMB	80.8	21.7	20.4	19.0	20.1
	COM/INST/RES	23.7	8.8	6.1	3.3	5.1
	IND PROC	906.9	288.7	302.9	176.8	156.2
	MISCELLANEOUS	79.5	19.7	19.9	19.8	19.9
	TOTAL	1267.7	390.3	391.9	264.5	243.6
REGION 10						
	UTILITY	67.4	23.4	15.7	8.2	22.7
	IND FUEL COMB	42.2	11.1	10.5	10.2	10.6
	COM/INST/RES	42.0	16.9	9.6	5.2	9.9
	IND PROC	175.8	53.3	55.4	36.8	33.4
	MISCELLANEOUS	34.1	9.2	8.5	7.8	8.4
	TOTAL	361.6	114.0	99.7	68.2	85.1
REGION TOTALS						
	UTILITY	15940.4	4266.7	3643.1	4269.6	3777.4
	IND FUEL COMB	2351.5	634.8	590.2	551.3	590.4
	COM/INST/RES	878.0	390.8	203.3	83.5	192.3
	IND PROC	3531.8	955.9	1003.1	804.3	793.8
	MISCELLANEOUS	891.2	248.3	222.7	198.8	218.6
	TOTAL	23592.9	6496.5	5662.3	5907.5	5572.5

TABLE C.7 1981 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN81-DEC81	WINTER DEC80-FEB81	SPRING MAR81-MAY81	SUMMER JUN81-AUG81	FALL SEP81-NOV81
REGION 1						
	UTILITY	342.2	102.3	76.9	83.7	80.2
	IND FUEL COMB	72.1	19.7	18.2	18.0	18.0
	COM/INST/RES	33.5	15.8	8.6	3.0	7.3
	IND PROC	14.0	3.2	3.7	3.7	3.6
	MISCELLANEOUS	62.0	19.5	15.7	12.0	14.8
	TOTAL	523.8	160.5	123.1	120.5	123.8
REGION 2						
	UTILITY	567.0	161.2	140.9	145.5	120.2
	IND FUEL COMB	139.9	37.5	35.7	35.3	34.2
	COM/INST/RES	127.1	59.3	32.3	11.9	28.2
	IND PROC	62.8	13.5	16.3	17.5	16.2
	MISCELLANEOUS	108.7	36.1	27.3	19.4	26.0
	TOTAL	1005.5	307.6	252.5	229.6	224.8
REGION 3						
	UTILITY	2450.8	661.9	566.4	636.1	594.9
	IND FUEL COMB	314.9	80.9	80.7	79.7	76.7
	COM/INST/RES	75.4	32.2	17.6	8.9	18.3
	IND PROC	293.4	72.6	79.3	77.1	70.3
	MISCELLANEOUS	121.1	36.5	30.2	24.9	29.5
	TOTAL	3255.7	884.3	774.2	826.7	789.6
REGION 4						
	UTILITY	4451.4	1144.4	1008.6	1298.0	1018.1
	IND FUEL COMB	522.0	135.8	133.0	131.7	128.3
	COM/INST/RES	80.9	40.5	18.0	8.3	16.9
	IND PROC	399.8	96.6	105.3	104.8	98.6
	MISCELLANEOUS	163.4	44.5	40.5	38.2	40.2
	TOTAL	5617.5	1461.8	1305.3	1581.0	1302.1
REGION 5						
	UTILITY	5362.8	1483.3	1283.0	1373.2	1262.4
	IND FUEL COMB	743.7	188.0	190.4	187.7	181.5
	COM/INST/RES	123.5	46.8	29.9	16.9	30.4
	IND PROC	515.9	123.9	138.4	135.7	125.6
	MISCELLANEOUS	145.9	40.2	36.6	33.2	35.9
	TOTAL	6891.9	1882.1	1678.4	1746.8	1635.8
REGION 6						
	UTILITY	482.3	116.3	99.1	142.6	118.2
	IND FUEL COMB	231.1	61.2	58.7	58.3	56.8
	COM/INST/RES	205.9	119.0	42.5	13.4	41.4
	IND PROC	765.1	186.2	197.8	197.0	189.7
	MISCELLANEOUS	112.9	28.4	28.2	28.1	28.2
	TOTAL	1797.4	511.0	426.3	439.5	434.3

TABLE C.7 (Cont'd)

	ANNUAL JAN81-DEC81	WINTER DEC80-FEB81	SPRING MAR81-MAY81	SUMMER JUN81-AUG81	FALL SEP81-NOV81
REGION 7					
UTILITY	1383.8	351.7	299.3	390.8	331.7
IND FUEL COMB	117.0	29.2	29.8	29.4	28.7
COM/INST/RES	19.1	7.3	3.9	2.9	5.2
IND PROC	131.5	28.5	33.9	36.7	33.8
MISCELLANEOUS	37.6	9.9	9.4	9.1	9.3
TOTAL	1689.0	426.6	376.2	468.8	408.7
REGION 8					
UTILITY	306.7	83.7	73.5	71.5	78.4
IND FUEL COMB	90.7	23.2	22.9	22.7	22.4
COM/INST/RES	27.5	9.6	7.1	4.5	6.7
IND PROC	207.1	49.7	54.3	52.8	51.1
MISCELLANEOUS	25.8	6.8	6.5	6.1	6.4
TOTAL	657.9	173.0	164.3	157.7	165.0
REGION 9					
UTILITY	186.9	46.5	42.4	51.4	48.1
IND FUEL COMB	70.7	19.2	18.1	17.8	17.2
COM/INST/RES	18.8	7.7	4.9	2.7	4.1
IND PROC	1079.5	265.0	290.1	261.6	258.9
MISCELLANEOUS	79.5	19.9	19.9	19.8	19.9
TOTAL	1435.5	358.3	375.3	353.2	348.2
REGION 10					
UTILITY	63.8	16.5	14.0	8.1	23.2
IND FUEL COMB	37.2	9.9	9.4	9.3	9.2
COM/INST/RES	34.7	15.1	7.9	4.5	8.2
IND PROC	199.9	49.2	53.4	49.3	48.1
MISCELLANEOUS	34.1	9.3	8.5	7.8	8.4
TOTAL	369.7	100.1	93.2	79.0	97.2
REGION TOTALS					
UTILITY	15597.8	4167.8	3604.1	4200.8	3675.4
IND FUEL COMB	2339.3	604.6	596.8	589.9	573.0
COM/INST/RES	746.4	353.3	172.7	77.2	166.7
IND PROC	3669.1	888.4	972.5	936.2	895.7
MISCELLANEOUS	891.2	251.1	222.7	198.8	218.6
TOTAL	23243.7	6265.2	5568.9	6002.8	5529.4

TABLE C.8 1982 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN82-DEC82	WINTER DEC81-FEB82	SPRING MAR82-MAY82	SUMMER JUN82-AUG82	FALL SEP82-NOV82
REGION 1						
	UTILITY	347.1	109.5	79.0	72.6	89.7
	IND FUEL COMB	73.4	17.9	18.2	18.1	18.7
	COM/INST/RES	33.4	14.4	8.6	3.1	7.3
	IND PROC	12.5	2.7	3.2	3.3	3.3
	MISCELLANEOUS	57.0	18.5	14.4	11.1	13.6
	TOTAL	523.4	163.1	123.4	108.2	132.6
REGION 2						
	UTILITY	513.5	151.9	122.1	126.8	116.3
	IND FUEL COMB	139.8	34.7	35.1	34.6	34.8
	COM/INST/RES	126.4	54.1	32.1	12.3	28.2
	IND PROC	56.5	11.5	14.2	16.0	15.1
	MISCELLANEOUS	100.0	34.2	25.1	17.9	23.9
	TOTAL	936.2	286.5	228.6	207.5	218.1
REGION 3						
	UTILITY	2343.7	643.2	581.3	595.5	538.8
	IND FUEL COMB	306.3	77.3	77.3	75.6	75.4
	COM/INST/RES	80.3	31.5	18.6	10.1	19.7
	IND PROC	236.0	58.8	62.8	60.9	57.2
	MISCELLANEOUS	111.5	34.6	27.8	22.9	27.2
	TOTAL	3077.8	845.4	767.7	765.0	718.3
REGION 4						
	UTILITY	3796.9	1015.7	896.7	1076.5	874.8
	IND FUEL COMB	513.0	127.4	128.3	126.8	128.5
	COM/INST/RES	84.3	38.0	18.9	9.2	18.0
	IND PROC	345.4	82.2	88.5	89.8	87.8
	MISCELLANEOUS	150.3	42.1	37.2	35.2	37.0
	TOTAL	4890.0	1305.5	1169.6	1337.5	1146.1
REGION 5						
	UTILITY	5125.5	1453.4	1230.8	1292.1	1188.8
	IND FUEL COMB	716.1	181.9	180.4	176.6	176.4
	COM/INST/RES	141.1	50.0	34.1	20.1	35.1
	IND PROC	420.3	102.3	110.3	109.5	104.5
	MISCELLANEOUS	134.2	38.0	33.7	30.6	33.0
	TOTAL	6537.2	1825.6	1589.2	1628.9	1537.9
REGION 6						
	UTILITY	557.8	132.4	121.0	158.1	138.6
	IND FUEL COMB	223.3	55.9	55.9	55.5	55.7
	COM/INST/RES	201.5	106.9	41.6	13.2	40.7
	IND PROC	701.0	169.8	176.8	180.1	178.4
	MISCELLANEOUS	103.9	26.9	26.0	25.9	26.0
	TOTAL	1787.5	491.9	421.2	432.7	439.3

TABLE C.8 (Cont'd)

		ANNUAL JAN82-DEC82	WINTER DEC81-FEB82	SPRING MAR82-MAY82	SUMMER JUN82-AUG82	FALL SEP82-NOV82
REGION 7						
	UTILITY	1355.6	355.2	291.2	384.3	337.1
	IND FUEL COMB	113.0	28.3	28.2	28.1	28.2
	COM/INST/RES	21.2	7.4	4.2	3.4	5.9
	IND PROC	148.7	30.4	36.9	40.5	39.2
	MISCELLANEOUS	34.6	9.3	8.6	8.3	8.6
	TOTAL	1673.2	430.6	369.2	464.7	419.0
REGION 8						
	UTILITY	322.0	92.7	71.3	75.2	83.7
	IND FUEL COMB	88.5	22.4	22.2	22.0	21.9
	COM/INST/RES	30.4	9.7	7.8	5.3	7.4
	IND PROC	184.6	45.4	46.9	47.1	46.9
	MISCELLANEOUS	23.8	6.4	6.0	5.6	5.9
	TOTAL	649.3	176.7	154.3	155.3	165.9
REGION 9						
	UTILITY	175.2	41.6	41.7	47.2	44.7
	IND FUEL COMB	70.6	17.6	17.7	17.5	17.5
	COM/INST/RES	18.5	7.1	4.8	2.7	4.0
	IND PROC	848.5	235.5	221.8	201.0	210.3
	MISCELLANEOUS	73.2	18.9	18.3	18.3	18.3
	TOTAL	1186.1	320.5	304.2	286.7	294.9
REGION 10						
	UTILITY	49.5	21.6	6.1	5.0	18.9
	IND FUEL COMB	36.8	9.2	9.2	9.1	9.3
	COM/INST/RES	35.2	14.2	8.0	4.7	8.3
	IND PROC	179.9	47.1	46.5	43.6	44.4
	MISCELLANEOUS	31.4	8.8	7.8	7.2	7.8
	TOTAL	332.9	100.9	77.5	69.5	88.7
REGION TOTALS						
	UTILITY	14586.7	4017.2	3441.1	3833.4	3431.4
	IND FUEL COMB	2280.9	572.7	572.4	564.1	566.5
	COM/INST/RES	772.5	333.2	178.7	84.0	174.7
	IND PROC	3133.6	785.8	807.8	791.7	787.1
	MISCELLANEOUS	819.9	237.7	204.9	182.9	201.1
	TOTAL	21593.6	5946.7	5205.0	5456.0	5160.8

TABLE C.9 1983 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN83-DEC83	WINTER DEC82-FEB83	SPRING MAR83-MAY83	SUMMER JUN83-AUG83	FALL SEP83-NOV83
REGION 1						
	UTILITY	336.3	98.1	83.2	83.1	74.3
	IND FUEL COMB	49.6	14.0	12.0	12.5	12.9
	COM/INST/RES	25.8	12.0	6.6	2.6	5.7
	IND PROC	13.6	2.8	3.4	3.7	3.7
	MISCELLANEOUS	53.9	17.3	13.6	10.5	12.9
	TOTAL	479.2	144.3	110.8	112.3	109.4
REGION 2						
	UTILITY	541.0	141.8	129.3	142.8	123.1
	IND FUEL COMB	108.9	28.3	26.4	27.5	28.6
	COM/INST/RES	97.3	45.1	24.7	10.1	21.8
	IND PROC	58.9	11.3	14.3	17.0	16.3
	MISCELLANEOUS	94.6	32.0	23.7	16.9	22.6
	TOTAL	900.7	258.6	218.4	214.3	212.4
REGION 3						
	UTILITY	2398.0	608.0	543.3	649.1	587.5
	IND FUEL COMB	287.2	68.8	69.6	72.6	75.9
	COM/INST/RES	69.2	28.4	15.8	9.5	17.3
	IND PROC	231.8	49.7	57.2	61.6	62.1
	MISCELLANEOUS	105.4	32.4	26.3	21.6	25.7
	TOTAL	3091.6	787.4	712.2	814.5	768.5
REGION 4						
	UTILITY	3719.2	873.5	768.9	1100.2	927.1
	IND FUEL COMB	444.0	111.6	107.4	112.2	116.5
	COM/INST/RES	70.2	33.1	16.0	8.4	15.5
	IND PROC	358.5	77.6	88.4	94.5	96.1
	MISCELLANEOUS	142.1	39.5	35.2	33.3	34.9
	TOTAL	4734.1	1135.2	1015.9	1348.5	1190.1
REGION 5						
	UTILITY	5221.8	1257.3	1145.1	1404.9	1315.2
	IND FUEL COMB	710.5	167.2	172.1	179.5	187.1
	COM/INST/RES	134.2	49.4	32.2	20.0	33.9
	IND PROC	416.2	89.1	103.9	111.6	111.2
	MISCELLANEOUS	126.9	35.6	31.9	28.9	31.2
	TOTAL	6609.6	1598.7	1485.1	1744.8	1678.7
REGION 6						
	UTILITY	660.2	149.8	143.3	188.4	168.7
	IND FUEL COMB	184.3	47.0	44.8	46.7	48.3
	COM/INST/RES	149.8	88.1	30.8	9.9	30.5
	IND PROC	710.9	161.0	177.3	185.3	186.6
	MISCELLANEOUS	98.2	25.2	24.5	24.5	24.5
	TOTAL	1803.5	471.1	420.9	454.8	458.5

TABLE C.9 (Cont'd)

		ANNUAL JAN83-DEC83	WINTER DEC82-FEB83	SPRING MAR83-MAY83	SUMMER JUN83-AUG83	FALL SEP83-NOV83
REGION 7						
	UTILITY	1274.4	304.4	276.3	383.1	313.4
	IND FUEL COMB	112.6	27.1	27.4	28.6	29.2
	COM/INST/RES	19.5	7.0	3.8	3.4	5.6
	IND PROC	145.7	29.8	35.1	40.8	40.2
	MISCELLANEOUS	32.7	8.7	8.2	7.9	8.1
	TOTAL	1584.9	377.0	350.8	455.7	396.5
REGION 8						
	UTILITY	307.4	80.9	66.2	74.8	83.3
	IND FUEL COMB	78.0	19.9	19.3	19.6	19.8
	COM/INST/RES	27.7	9.0	7.1	5.2	6.8
	IND PROC	180.3	41.4	46.1	46.8	46.8
	MISCELLANEOUS	22.5	6.0	5.7	5.3	5.6
	TOTAL	615.9	157.2	144.4	151.8	162.3
REGION 9						
	UTILITY	145.4	39.3	31.5	39.5	35.8
	IND FUEL COMB	53.0	14.0	12.9	13.4	13.9
	COM/INST/RES	14.0	5.8	3.6	2.1	3.1
	IND PROC	787.0	199.8	215.4	190.4	191.0
	MISCELLANEOUS	69.2	17.7	17.3	17.3	17.3
	TOTAL	1068.7	276.5	280.7	262.6	261.1
REGION 10						
	UTILITY	68.2	17.1	8.8	13.6	26.7
	IND FUEL COMB	28.2	7.6	6.9	7.1	7.3
	COM/INST/RES	28.0	12.1	6.3	3.9	6.7
	IND PROC	167.5	41.1	44.0	41.2	42.0
	MISCELLANEOUS	29.7	8.3	7.4	6.8	7.3
	TOTAL	321.6	86.2	73.3	72.6	90.1
REGION TOTALS						
	UTILITY	14672.0	3570.2	3187.9	4071.5	3655.2
	IND FUEL COMB	2056.3	505.5	498.7	519.8	539.4
	COM/INST/RES	635.6	290.1	147.0	74.9	146.8
	IND PROC	3070.4	703.8	785.1	792.8	796.0
	MISCELLANEOUS	775.3	222.6	193.7	173.0	190.2
	TOTAL	21209.6	5292.2	4812.5	5631.9	5327.6

TABLE C.10 1984 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN84-DEC84	WINTER DEC83-FEB84	SPRING MAR84-MAY84	SUMMER JUN84-AUG84	FALL SEP84-NOV84
REGION 1						
	UTILITY	353.1	101.8	83.5	92.4	80.3
	IND FUEL COMB	54.1	13.3	13.5	13.6	13.5
	COM/INST/RES	26.1	10.9	6.7	2.7	5.8
	IND PROC	14.4	3.1	3.7	3.9	3.7
	MISCELLANEOUS	56.4	17.5	14.2	10.9	13.5
	TOTAL	504.1	146.5	121.5	123.5	116.8
REGION 2						
	UTILITY	540.3	146.0	120.3	144.2	132.0
	IND FUEL COMB	117.9	28.9	29.5	29.7	29.4
	COM/INST/RES	98.2	40.9	25.0	10.3	22.0
	IND PROC	62.7	12.2	15.7	17.9	16.6
	MISCELLANEOUS	99.0	32.3	24.8	17.7	23.6
	TOTAL	918.1	260.3	215.3	219.9	223.7
REGION 3						
	UTILITY	2352.6	622.1	579.1	617.1	552.3
	IND FUEL COMB	308.0	75.8	77.4	77.7	76.8
	COM/INST/RES	72.0	27.2	16.3	10.0	18.1
	IND PROC	258.6	57.7	69.3	68.1	63.0
	MISCELLANEOUS	110.2	32.8	27.5	22.6	26.9
	TOTAL	3101.4	815.6	769.7	795.7	737.0
REGION 4						
	UTILITY	3641.2	935.6	824.0	1028.1	900.2
	IND FUEL COMB	478.9	117.5	119.5	120.9	119.8
	COM/INST/RES	72.4	30.7	16.6	8.8	16.1
	IND PROC	384.8	86.3	98.9	101.8	97.3
	MISCELLANEOUS	148.7	39.9	36.8	34.8	36.6
	TOTAL	4725.9	1210.0	1095.8	1294.4	1169.9
REGION 5						
	UTILITY	5399.8	1508.7	1287.5	1430.5	1264.6
	IND FUEL COMB	760.8	187.9	191.3	191.8	189.4
	COM/INST/RES	142.6	49.9	34.2	21.4	36.1
	IND PROC	449.2	98.2	118.9	119.9	111.4
	MISCELLANEOUS	132.8	36.0	33.3	30.2	32.6
	TOTAL	6885.1	1880.7	1665.3	1793.8	1634.2
REGION 6						
	UTILITY	674.6	180.0	146.5	196.1	156.4
	IND FUEL COMB	203.8	49.3	51.1	51.5	50.9
	COM/INST/RES	150.2	78.7	30.9	9.9	30.6
	IND PROC	727.2	167.8	184.7	190.5	184.0
	MISCELLANEOUS	102.8	25.4	25.7	25.6	25.7
	TOTAL	1858.6	501.2	438.9	473.6	447.6

TABLE C.10 (Cont'd)

		ANNUAL JAN84-DEC84	WINTER DEC83-FEB84	SPRING MAR84-MAY84	SUMMER JUN84-AUG84	FALL SEP84-NOV84
REGION 7						
	UTILITY	1358.1	338.3	311.0	388.6	325.3
	IND FUEL COMB	120.1	29.5	30.0	30.3	30.1
	COM/INST/RES	20.5	6.8	4.0	3.6	6.0
	IND PROC	144.5	30.4	36.0	40.7	38.2
	MISCELLANEOUS	34.3	8.8	8.5	8.2	8.5
	TOTAL	1677.5	413.8	389.6	471.5	408.1
REGION 8						
	UTILITY	372.6	96.3	80.4	92.9	97.3
	IND FUEL COMB	84.4	20.6	21.2	21.2	21.1
	COM/INST/RES	29.1	8.9	7.4	5.6	7.1
	IND PROC	177.4	40.6	45.6	46.6	44.6
	MISCELLANEOUS	29.8	7.2	7.5	7.1	7.4
	TOTAL	693.3	173.6	162.1	173.4	177.6
REGION 9						
	UTILITY	145.3	38.7	32.2	41.8	35.0
	IND FUEL COMB	57.9	14.2	14.5	14.6	14.4
	COM/INST/RES	14.1	5.3	3.7	2.1	3.1
	IND PROC	724.8	177.8	193.3	180.7	173.8
	MISCELLANEOUS	72.4	17.9	18.1	18.0	18.1
	TOTAL	1014.4	253.9	261.8	257.3	244.4
REGION 10						
	UTILITY	70.0	22.0	5.1	16.0	26.9
	IND FUEL COMB	30.9	7.5	7.7	7.8	7.7
	COM/INST/RES	28.6	11.3	6.4	4.0	6.8
	IND PROC	156.8	38.7	41.0	39.7	38.3
	MISCELLANEOUS	31.0	8.4	7.7	7.1	7.7
	TOTAL	317.4	87.9	68.0	74.6	87.5
REGION TOTALS						
	UTILITY	14907.8	3989.4	3469.7	4047.7	3570.5
	IND FUEL COMB	2216.7	544.5	555.8	559.2	553.2
	COM/INST/RES	653.8	270.6	151.2	78.5	151.7
	IND PROC	3100.5	712.8	807.1	810.0	770.9
	MISCELLANEOUS	817.2	226.2	204.2	182.4	200.5
	TOTAL	21696.0	5743.4	5187.9	5677.7	5246.8

TABLE C.11 1985 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
REGION 1						
	UTILITY	336.8	97.3	71.9	79.1	84.0
	IND FUEL COMB	49.5	12.8	12.4	12.3	12.6
	COM/INST/RES	25.5	10.9	6.5	2.5	5.6
	IND PROC	14.2	3.1	3.7	3.8	3.7
	MISCELLANEOUS	57.0	17.9	14.4	11.1	13.6
	TOTAL	483.1	141.8	109.0	108.8	119.5
REGION 2						
	UTILITY	486.8	145.2	114.6	125.8	106.6
	IND FUEL COMB	112.8	27.8	28.2	28.5	28.9
	COM/INST/RES	96.1	40.6	24.4	9.8	21.5
	IND PROC	63.2	12.0	16.2	18.0	16.8
	MISCELLANEOUS	100.0	33.1	25.1	17.9	23.9
	TOTAL	859.0	258.7	208.6	199.9	197.6
REGION 3						
	UTILITY	2396.5	627.5	587.7	615.2	547.8
	IND FUEL COMB	309.1	75.0	77.9	77.9	78.7
	COM/INST/RES	66.6	26.4	15.2	8.9	16.6
	IND PROC	253.4	54.9	66.2	66.8	64.6
	MISCELLANEOUS	111.5	33.5	27.8	22.9	27.2
	TOTAL	3137.1	817.3	774.9	791.8	734.8
REGION 4						
	UTILITY	3854.8	912.5	888.9	1078.8	922.3
	IND FUEL COMB	471.3	116.1	118.0	118.6	120.3
	COM/INST/RES	68.1	30.3	15.5	7.9	14.9
	IND PROC	378.7	84.3	97.2	99.9	97.0
	MISCELLANEOUS	150.3	40.8	37.2	35.2	37.0
	TOTAL	4923.1	1183.9	1156.8	1340.4	1191.5
REGION 5						
	UTILITY	5015.7	1326.4	1184.1	1279.4	1186.4
	IND FUEL COMB	773.2	187.0	195.1	194.5	196.7
	COM/INST/RES	126.3	47.2	30.4	18.7	31.8
	IND PROC	440.2	93.8	115.2	117.1	112.8
	MISCELLANEOUS	134.1	36.8	33.7	30.6	33.0
	TOTAL	6489.5	1691.2	1558.4	1640.3	1560.7
REGION 6						
	UTILITY	651.1	166.5	141.2	189.7	151.2
	IND FUEL COMB	197.5	48.3	49.0	50.3	50.6
	COM/INST/RES	149.6	78.6	30.8	9.9	30.4
	IND PROC	711.0	164.0	181.6	185.1	180.6
	MISCELLANEOUS	103.9	26.0	26.0	25.9	26.0
	TOTAL	1813.1	483.4	428.5	460.8	438.7

TABLE C.11 (Cont'd)

	ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
REGION 7					
UTILITY	1216.6	354.9	289.5	315.6	273.3
IND FUEL COMB	122.3	29.0	29.9	31.6	31.8
COM/INST/RES	18.5	6.6	3.6	3.2	5.3
IND PROC	146.3	29.3	37.2	40.7	38.7
MISCELLANEOUS	34.6	9.0	8.6	8.3	8.6
TOTAL	1538.3	428.8	368.9	399.3	357.8
REGION 8					
UTILITY	363.8	103.3	85.4	88.9	90.0
IND FUEL COMB	83.6	20.6	20.8	21.1	21.2
COM/INST/RES	26.3	8.5	6.7	4.9	6.4
IND PROC	169.9	38.9	44.2	44.2	42.9
MISCELLANEOUS	30.1	7.8	7.6	7.2	7.5
TOTAL	673.6	179.1	164.8	166.2	168.0
REGION 9					
UTILITY	127.5	35.0	33.5	33.0	26.7
IND FUEL COMB	54.8	13.4	13.6	14.0	14.1
COM/INST/RES	13.9	5.3	3.6	2.0	3.0
IND PROC	646.3	165.1	176.0	155.7	155.7
MISCELLANEOUS	73.2	18.3	18.3	18.3	18.3
TOTAL	915.7	237.0	245.1	222.9	217.8
REGION 10					
UTILITY	89.0	24.3	12.7	23.5	26.7
IND FUEL COMB	29.4	7.3	7.3	7.4	7.5
COM/INST/RES	27.5	11.1	6.2	3.8	6.6
IND PROC	142.1	36.1	37.8	34.9	34.5
MISCELLANEOUS	31.4	8.6	7.8	7.2	7.8
TOTAL	319.5	87.4	71.9	76.8	83.1
REGION TOTALS					
UTILITY	14538.6	3793.0	3409.6	3829.0	3415.2
IND FUEL COMB	2203.5	537.2	552.4	556.2	562.3
COM/INST/RES	618.4	265.4	143.0	71.5	142.1
IND PROC	2965.3	681.4	775.4	766.0	747.3
MISCELLANEOUS	826.1	231.7	206.4	184.4	202.7
TOTAL	21151.9	5508.7	5086.9	5407.2	5069.5

TABLE C.12 1986 Sectoral SO_2 Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
REGION 1						
	UTILITY	355.1	105.5	88.3	87.1	76.4
	IND FUEL COMB	56.0	13.2	13.9	14.1	14.3
	COM/INST/RES	25.9	10.9	6.7	2.6	5.7
	IND PROC	15.1	3.3	2.2	4.0	3.9
	MISCELLANEOUS	58.2	18.2	14.7	11.3	13.9
	TOTAL	510.4	151.1	127.4	119.0	114.2
REGION 2						
	UTILITY	423.9	120.4	103.7	110.0	93.9
	IND FUE4- COMB	122.1	29.0	30.5	30.9	31.0
	COM/INST/RES	97.6	40.9	24.8	9.9	21.8
	IND PROC	66.6	13.3	16.7	18.5	17.7
	MISCELLANEOUS	102.2	33.7	25.6	18.3	24.4
	TOTAL	812.3	237.2	201.4	187.6	188.8
REGION 3						
	UTILITY	2349.3	636.1	543.8	609.5	562.1
	IND FUEL COMB	319.1	77.4	80.3	80.3	80.5
	COM/INST/RES	67.6	26.1	15.5	9.1	16.8
	IND PROC	255.2	59.4	67.3	65.4	63.1
	MISCELLANEOUS	113.9	34.1	28.4	23.4	27.7
	TOTAL	3105.2	833.1	735.3	787.6	750.2
REGION 4						
	UTILITY	3873.4	975.6	896.6	1116.0	936.8
	IND FUEL COMB	495.2	118.7	123.3	125.3	126.0
	COM/INST/RES	69.1	30.1	15.7	8.0	15.1
	IND PROC	387.9	88.2	99.2	100.5	98.6
	MISCELLANEOUS	153.6	41.5	38.1	35.9	37.8
	TOTAL	4979.1	1254.1	1172.8	1385.8	1214.3
REGION 5						
	UTILITY	4887.9	1356.2	1145.3	1325.5	1139.0
	IND FUEL COMB	787.5	192.4	198.6	197.4	198.7
	COM/INST/RES	128.1	45.9	30.8	18.9	32.2
	IND PROC	453.0	101.9	117.5	118.1	114.2
	MISCELLANEOUS	137.0	37.5	34.4	31.2	33.7
	TOTAL	6393.5	1733.9	1526.7	1691.1	1517.9
REGION 6						
	UTILITY	710.7	186.0	137.6	206.2	175.2
	IND FUEL COMB	205.7	49.3	50.8	52.6	52.4
	COM/INST/RES	152.2	79.4	31.4	10.0	30.9
	IND PROC	735.6	170.9	185.5	189.4	187.2
	MISCELLANEOUS	106.2	26.5	26.5	26.5	26.5
	TOTAL	1910.4	512.0	431.9	484.6	472.3

TABLE C.12 (Cont'd)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
REGION 7						
	UTILITY	1168.1	280.8	257.1	336.5	279.9
	IND FUEL COMB	124.8	29.6	30.6	32.2	32.2
	COM/INST/RES	18.7	6.4	3.7	3.2	5.4
	IND PROC	152.7	31.8	38.4	41.4	40.2
	MISCELLANEOUS	35.4	9.2	8.8	8.5	8.8
	TOTAL	1499.6	357.9	338.7	421.8	366.5
REGION 8						
	UTILITY	333.8	99.4	70.8	80.2	85.5
	IND FUEL COMB	87.1	21.2	21.8	21.9	21.9
	COM/INST/RES	26.7	8.4	6.8	5.0	6.5
	IND PROC	179.9	40.8	45.3	46.6	46.2
	MISCELLANEOUS	30.8	8.0	7.7	7.3	7.7
	TOTAL	658.3	177.8	152.3	161.0	167.9
REGION 9						
	UTILITY	138.0	34.2	31.7	37.5	32.4
	IND FUEL COMB	59.6	14.0	14.9	15.1	15.2
	COM/INST/RES	14.2	5.3	3.7	2.1	3.1
	IND PROC	700.5	167.9	176.9	174.3	176.8
	MISCELLANEOUS	74.8	18.6	18.7	18.6	18.7
	TOTAL	987.0	240.1	245.9	247.6	246.2
REGION 10						
	UTILITY	40.8	20.1	0.0	8.5	15.8
	IND FUEL COMB	31.6	7.5	7.8	8.0	8.1
	COM/INST/RES	28.0	11.1	6.3	3.8	6.7
	IND PROC	147.8	35.6	37.7	36.7	37.2
	MISCELLANEOUS	32.0	8.7	8.0	7.4	7.9
	TOTAL	280.2	83.1	59.8	64.5	75.7
REGION TOTALS						
	UTILITY	14281.1	3814.3	3274.9	3916.8	3397.1
	IND FUEL COMB	2288.7	552.4	572.5	577.9	580.4
	COM/INST/RES	628.0	264.5	145.2	72.5	144.3
	IND PROC	3094.2	713.2	788.4	794.8	785.1
	MISCELLANEOUS	844.0	235.9	210.9	188.5	207.1
	TOTAL	21136.0	5580.4	4992.0	5550.5	5113.9

C.2 NO_x EMISSIONS

TABLE C.13 1975 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN75-DEC75	WINTER DEC74-FEB75	SPRING MAR75-MAY75	SUMMER JUN75-AUG75	FALL SEP75-NOV75
REGION 1						
	UTILITY	98.1	19.2	23.2	25.2	21.7
	IND FUEL COMB	32.8	5.5	8.2	8.1	8.2
	COM/INST/RES	32.6	9.7	8.4	2.6	7.0
	IND PROC	1.5	0.2	0.4	0.4	0.4
	TRANSPORTATION	337.0	50.1	80.7	92.5	87.0
	MISCELLANEOUS	52.6	12.1	13.3	8.8	12.3
	TOTAL	554.6	96.9	134.2	137.7	136.7
REGION 2						
	UTILITY	208.9	34.6	49.2	58.6	49.1
	IND FUEL COMB	206.0	34.7	51.6	51.0	51.7
	COM/INST/RES	119.4	35.1	30.4	10.0	26.3
	IND PROC	17.0	2.6	4.3	4.5	4.3
	TRANSPORTATION	545.8	81.1	131.9	148.9	140.2
	MISCELLANEOUS	98.3	22.8	24.8	16.2	23.1
	TOTAL	1195.3	210.7	292.2	289.2	294.7
REGION 3						
	UTILITY	681.9	121.4	162.1	177.5	160.6
	IND FUEL COMB	180.5	30.6	45.4	44.5	45.1
	COM/INST/RES	69.3	18.1	16.9	8.8	16.4
	IND PROC	71.6	11.3	18.6	18.5	18.0
	TRANSPORTATION	705.8	104.4	173.1	190.6	180.8
	MISCELLANEOUS	163.7	32.8	40.9	33.7	39.9
	TOTAL	1872.8	318.6	456.9	473.6	460.8
REGION 4						
	UTILITY	1072.1	163.6	250.8	299.2	263.8
	IND FUEL COMB	408.2	69.5	102.0	100.3	102.0
	COM/INST/RES	121.1	30.9	28.2	19.3	26.6
	IND PROC	116.6	18.8	30.7	28.7	29.2
	TRANSPORTATION	1307.2	202.4	328.9	342.9	325.7
	MISCELLANEOUS	270.2	49.6	66.7	62.6	66.2
	TOTAL	3295.4	534.8	807.4	852.9	813.5
REGION 5						
	UTILITY	1504.4	258.1	350.7	404.1	359.3
	IND FUEL COMB	382.2	66.1	96.0	93.0	94.9
	COM/INST/RES	144.9	42.4	36.8	12.3	32.0
	IND PROC	107.6	17.3	28.5	27.3	26.6
	TRANSPORTATION	1412.2	208.2	344.2	382.0	363.6
	MISCELLANEOUS	323.6	66.2	81.4	64.9	77.8
	TOTAL	3874.8	658.4	937.6	983.5	954.3

TABLE C.13 (Cont'd)

		ANNUAL JAN75-DEC75	WINTER DEC74-FEB75	SPRING MAR75-MAY75	SUMMER JUN75-AUG75	FALL SEP75-NOV75
REGION 6						
	UTILITY	539.3	77.1	121.7	162.2	133.2
	IND FUEL COMB	1662.7	294.4	416.0	397.7	409.6
	COM/INST/RES	96.8	34.1	19.7	6.1	19.0
	IND PROC	206.4	33.8	52.9	51.4	51.6
	TRANSPORTATION	963.1	148.2	241.5	252.6	238.6
	MISCELLANEOUS	303.5	54.9	74.8	71.7	74.7
	TOTAL	3771.8	642.5	926.6	941.7	926.7
REGION 7						
	UTILITY	327.9	56.7	69.5	94.7	77.7
	IND FUEL COMB	229.1	41.4	57.2	54.0	56.0
	COM/INST/RES	36.7	11.6	8.5	2.7	7.9
	IND PROC	48.4	7.6	12.4	12.3	12.3
	TRANSPORTATION	458.8	67.3	112.1	125.3	117.5
	MISCELLANEOUS	118.7	23.8	29.2	25.0	28.6
	TOTAL	1219.6	208.3	288.9	314.0	300.1
REGION 8						
	UTILITY	171.2	28.4	37.8	43.6	43.7
	IND FUEL COMB	126.4	22.0	31.6	30.7	31.2
	COM/INST/RES	31.1	8.1	8.3	3.2	7.3
	IND PROC	14.8	2.1	3.7	4.0	3.9
	TRANSPORTATION	255.4	36.9	59.7	72.5	66.6
	MISCELLANEOUS	154.8	26.9	38.9	37.0	38.5
	TOTAL	753.8	124.4	180.0	190.9	191.2
REGION 9						
	UTILITY	148.4	23.4	31.9	40.3	40.3
	IND FUEL COMB	146.5	25.6	36.7	35.4	36.2
	COM/INST/RES	48.3	13.6	12.4	6.2	10.3
	IND PROC	86.8	13.7	22.2	22.3	22.0
	TRANSPORTATION	843.6	129.3	209.3	226.2	210.2
	MISCELLANEOUS	173.4	31.9	43.6	40.1	42.4
	TOTAL	1447.0	237.5	356.0	370.5	361.4
REGION 10						
	UTILITY	27.4	4.7	4.9	6.9	8.8
	IND FUEL COMB	77.2	12.9	19.3	19.2	19.3
	COM/INST/RES	18.4	5.2	4.3	2.2	4.3
	IND PROC	18.1	2.9	4.7	4.5	4.5
	TRANSPORTATION	271.4	39.2	67.3	74.5	68.7
	MISCELLANEOUS	112.8	19.4	28.1	27.6	28.1
	TOTAL	525.2	84.2	128.6	134.8	133.8

TABLE C.13 (Cont'd)

	ANNUAL JAN75-DEC75	WINTER DEC74-FEB75	SPRING MAR75-MAY75	SUMMER JUN75-AUG75	FALL SEP75-NOV75
REGION TOTAL					
UTILITY	4779.6	787.1	1101.6	1312.3	1158.3
IND FUEL COMB	3451.5	602.6	864.1	834.0	854.4
COM/INST/RES	718.5	209.0	173.8	73.2	157.1
IND PROC	688.8	110.2	178.5	173.8	172.7
TRANSPORTATION	7100.2	1067.1	1748.7	1907.8	1799.0
MISCELLANEOUS	1771.7	340.3	441.7	387.7	431.7
TOTAL	18510.2	3116.3	4508.3	4688.8	4573.2

TABLE C.14 1976 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN76-DEC76	WINTER DEC75-FEB76	SPRING MAR76-MAY76	SUMMER JUN76-AUG76	FALL SEP76-NOV76
REGION 1						
	UTILITY	89.2	25.3	20.2	22.9	20.9
	IND FUEL COMB	38.7	9.2	9.6	9.6	9.7
	COM/INST/RES	35.2	15.4	9.1	2.7	7.6
	IND PROC	1.8	0.4	0.5	0.5	0.5
	TRANSPORTATION	349.0	78.6	83.6	95.7	90.1
	MISCELLANEOUS	55.5	18.8	14.1	9.3	13.0
	TOTAL	569.4	147.7	137.1	140.7	141.7
REGION 2						
	UTILITY	205.8	53.7	48.1	54.2	48.3
	IND FUEL COMB	228.8	55.5	57.3	56.7	57.4
	COM/INST/RES	129.5	55.7	33.0	10.7	28.5
	IND PROC	17.5	3.9	4.5	4.6	4.5
	TRANSPORTATION	564.1	127.6	136.3	153.8	144.9
	MISCELLANEOUS	103.7	35.4	26.1	17.1	24.4
	TOTAL	1249.4	331.8	305.3	297.2	308.0
REGION 3						
	UTILITY	726.6	183.6	176.3	185.8	175.3
	IND FUEL COMB	188.5	46.8	47.4	46.5	47.1
	COM/INST/RES	74.4	28.5	18.2	9.6	17.5
	IND PROC	73.2	16.7	19.0	18.9	18.4
	TRANSPORTATION	732.2	165.1	179.6	197.7	187.6
	MISCELLANEOUS	172.8	51.1	43.1	35.6	42.1
	TOTAL	1967.8	491.9	483.7	494.1	488.1
REGION 4						
	UTILITY	1199.7	283.9	274.0	330.4	298.6
	IND FUEL COMB	443.0	109.7	110.7	108.9	110.7
	COM/INST/RES	138.1	50.6	32.2	22.9	30.6
	IND PROC	122.2	28.9	32.1	30.2	30.6
	TRANSPORTATION	1357.6	317.4	341.7	356.0	338.3
	MISCELLANEOUS	285.2	77.5	70.4	66.1	69.9
	TOTAL	3545.9	868.1	861.2	914.4	878.7
REGION 5						
	UTILITY	1548.1	403.1	368.9	391.7	375.5
	IND FUEL COMB	395.7	100.7	99.4	96.2	98.2
	COM/INST/RES	147.3	64.8	37.5	12.1	32.3
	IND PROC	109.9	25.5	29.0	27.9	27.3
	TRANSPORTATION	1466.9	330.5	357.6	396.5	377.8
	MISCELLANEOUS	341.5	103.1	85.9	68.5	82.2
	TOTAL	4009.3	1027.7	978.4	992.9	993.2

TABLE C.14 (Cont'd)

		ANNUAL JAN76-DEC76	WINTER DEC75-FEB76	SPRING MAR76-MAY76	SUMMER JUN76-AUG76	FALL SEP76-NOV76
REGION 6						
	UTILITY	576.3	130.4	126.7	170.1	144.7
	IND FUEL COMB	1813.9	466.1	453.9	433.9	446.9
	COM/INST/RES	104.6	54.7	21.3	6.6	20.6
	IND PROC	209.0	50.8	53.6	52.1	52.3
	TRANSPORTATION	1004.2	236.8	251.8	263.3	248.8
	MISCELLANEOUS	320.4	85.5	78.9	75.7	78.8
	TOTAL	4028.3	1024.2	986.2	1001.7	992.0
REGION 7						
	UTILITY	352.5	88.0	77.3	99.0	86.2
	IND FUEL COMB	246.1	64.9	61.5	58.0	60.2
	COM/INST/RES	37.9	18.1	8.8	2.7	8.1
	IND PROC	49.2	11.5	12.6	12.5	12.6
	TRANSPORTATION	478.3	106.8	116.9	130.5	122.5
	MISCELLANEOUS	125.3	37.2	30.8	26.4	30.2
	TOTAL	1289.3	326.5	307.8	329.1	319.8
REGION 8						
	UTILITY	216.4	54.5	49.1	54.7	53.8
	IND FUEL COMB	134.5	34.3	33.7	32.6	33.2
	COM/INST/RES	31.5	12.6	8.4	3.1	7.4
	IND PROC	15.5	3.2	3.9	4.2	4.1
	TRANSPORTATION	267.2	58.3	62.4	75.8	69.7
	MISCELLANEOUS	163.4	41.9	41.1	39.1	40.7
	TOTAL	828.6	204.9	198.6	209.4	208.8
REGION 9						
	UTILITY	185.7	38.1	41.4	54.6	46.5
	IND FUEL COMB	163.0	41.0	40.9	39.5	40.3
	COM/INST/RES	50.8	20.2	13.0	6.5	10.8
	IND PROC	88.8	20.6	22.7	22.9	22.5
	TRANSPORTATION	875.8	202.9	217.3	234.7	218.2
	MISCELLANEOUS	183.1	49.1	46.0	42.4	44.8
	TOTAL	1547.1	371.8	381.2	400.5	383.2
REGION 10						
	UTILITY	28.0	6.1	5.1	4.4	10.6
	IND FUEL COMB	89.5	21.4	22.4	22.3	22.4
	COM/INST/RES	19.8	8.1	4.6	2.3	4.6
	IND PROC	21.4	4.9	5.6	5.3	5.4
	TRANSPORTATION	282.6	62.5	70.1	77.5	71.5
	MISCELLANEOUS	119.1	30.1	29.7	29.1	29.7
	TOTAL	560.4	133.0	137.4	141.0	144.2

TABLE C.14 (Cont'd)

	ANNUAL JAN76-DEC76	WINTER DEC75-FEB76	SPRING MAR76-MAY76	SUMMER JUN76-AUG76	FALL SEP76-NOV76
REGION TOTAL					
UTILITY	5128.4	1266.7	1187.2	1367.6	1260.4
IND FUEL COMB	3741.8	949.7	936.7	904.2	926.2
COM/INST/RES	769.0	328.7	186.1	79.1	168.0
IND PROC	708.5	166.4	183.4	179.3	178.0
TRANSPORTATION	7377.7	1686.6	1817.2	1981.6	1869.4
MISCELLANEOUS	1870.1	529.6	466.2	409.2	455.6
TOTAL	19595.4	4927.7	4776.9	4920.9	4857.6

TABLE C.15 1977 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN77-DEC77	WINTER DEC76-FEB77	SPRING MAR77-MAY77	SUMMER JUN77-AUG77	FALL SEP77-NOV77
REGION 1						
	UTILITY	90.3	26.0	19.9	22.0	21.3
	IND FUEL COMB	39.8	9.9	9.9	9.8	10.0
	COM/INST/RES	33.9	15.4	8.7	2.7	7.3
	IND PROC	1.9	0.4	0.5	0.5	0.5
	TRANSPORTATION	356.9	80.7	85.5	97.9	92.1
	MISCELLANEOUS	59.0	19.9	15.0	9.9	13.8
	TOTAL	581.8	152.3	139.5	142.8	145.0
REGION 2						
	UTILITY	216.3	59.2	48.8	59.4	50.0
	IND FUEL COMB	231.3	57.9	57.9	57.3	58.0
	COM/INST/RES	124.7	55.8	31.7	10.5	27.5
	IND PROC	18.5	4.1	4.7	4.9	4.7
	TRANSPORTATION	576.2	130.9	139.3	157.1	148.0
	MISCELLANEOUS	110.3	37.6	27.8	18.2	25.9
	TOTAL	1277.3	345.3	310.2	307.4	314.2
REGION 3						
	UTILITY	718.8	196.3	172.4	188.0	167.8
	IND FUEL COMB	186.8	47.2	47.0	46.1	46.7
	COM/INST/RES	72.1	28.5	17.6	9.3	17.1
	IND PROC	76.6	17.4	19.9	19.8	19.3
	TRANSPORTATION	749.9	169.9	183.9	202.4	192.2
	MISCELLANEOUS	183.7	54.2	45.8	37.8	44.8
	TOTAL	1988.0	513.4	486.7	503.5	487.8
REGION 4						
	UTILITY	1240.1	322.9	262.9	364.8	294.2
	IND FUEL COMB	439.0	112.0	109.7	107.9	109.7
	COM/INST/RES	129.0	50.3	30.1	21.1	28.5
	IND PROC	125.0	29.8	32.8	30.9	31.3
	TRANSPORTATION	1391.1	326.8	350.2	364.7	346.7
	MISCELLANEOUS	303.3	82.2	74.9	70.3	74.3
	TOTAL	3627.4	923.9	860.6	959.7	884.7
REGION 5						
	UTILITY	1582.6	419.4	370.2	412.7	385.1
	IND FUEL COMB	390.4	100.9	98.1	94.9	96.9
	COM/INST/RES	143.8	64.0	36.6	12.2	31.7
	IND PROC	114.5	26.4	30.2	29.1	28.4
	TRANSPORTATION	1503.3	340.5	366.5	406.2	387.2
	MISCELLANEOUS	363.1	109.4	91.4	72.8	87.3
	TOTAL	4097.7	1060.6	992.9	1027.9	1016.6

TABLE C.15 (Cont'd)

		ANNUAL JAN77-DEC77	WINTER DEC76-FEB77	SPRING MAR77-MAY77	SUMMER JUN77-AUG77	FALL SEP77-NOV77
REGION 6						
	UTILITY	638.6	145.5	144.4	197.0	152.4
	IND FUEL COMB	1815.2	479.4	454.2	434.3	447.2
	COM/INST/RES	100.1	54.5	20.4	6.3	19.7
	IND PROC	219.3	52.7	56.2	54.7	54.9
	TRANSPORTATION	1031.6	244.5	258.7	270.4	255.6
	MISCELLANEOUS	340.6	90.6	83.9	80.4	83.8
	TOTAL	4145.4	1067.4	1017.7	1043.2	1013.5
REGION 7						
	UTILITY	375.4	94.8	81.5	104.4	90.5
	IND FUEL COMB	245.5	66.4	61.3	57.8	60.0
	COM/INST/RES	36.3	17.7	8.4	2.7	7.8
	IND PROC	50.3	11.7	12.8	12.8	12.8
	TRANSPORTATION	491.3	110.3	120.1	134.0	125.9
	MISCELLANEOUS	133.2	39.4	32.8	28.1	32.1
	TOTAL	1332.0	340.3	316.9	339.7	329.1
REGION 8						
	UTILITY	260.1	67.4	59.0	68.2	62.7
	IND FUEL COMB	133.8	34.9	33.5	32.4	33.0
	COM/INST/RES	31.0	12.4	8.2	3.2	7.3
	IND PROC	16.4	3.4	4.1	4.5	4.3
	TRANSPORTATION	275.0	60.4	64.3	77.9	71.7
	MISCELLANEOUS	173.8	44.5	43.6	41.5	43.2
	TOTAL	890.0	223.1	212.7	227.7	222.3
REGION 9						
	UTILITY	226.2	50.7	56.2	64.4	56.4
	IND FUEL COMB	163.7	42.5	41.0	39.6	40.5
	COM/INST/RES	48.4	19.8	12.4	6.2	10.3
	IND PROC	93.5	21.5	23.9	24.1	23.7
	TRANSPORTATION	897.3	208.9	222.6	240.5	223.6
	MISCELLANEOUS	194.6	52.1	48.9	45.1	47.6
	TOTAL	1623.7	395.4	405.0	419.8	402.1
REGION 10						
	UTILITY	37.0	10.0	9.7	6.5	11.1
	IND FUEL COMB	86.8	22.0	21.7	21.6	21.7
	COM/INST/RES	19.1	8.0	4.4	2.3	4.4
	IND PROC	21.7	5.2	5.6	5.4	5.5
	TRANSPORTATION	290.0	64.5	72.0	79.5	73.4
	MISCELLANEOUS	126.6	31.9	31.6	31.0	31.6
	TOTAL	581.3	141.6	145.0	146.2	147.7

TABLE C.15 (Cont'd)

	ANNUAL JAN77-DEC77	WINTER DEC76-FEB77	SPRING MAR77-MAY77	SUMMER JUN77-AUG77	FALL SEP77-NOV77
REGION TOTAL					
UTILITY	5385.5	1392.1	1225.0	1487.4	1291.6
IND FUEL COMB	3732.1	973.0	934.3	901.7	923.8
COM/INST/RES	738.3	326.4	178.5	76.4	161.7
IND PROC	737.7	172.6	190.9	186.7	185.3
TRANSPORTATION	7562.7	1737.4	1862.9	2030.7	1916.4
MISCELLANEOUS	1988.2	561.7	495.7	435.0	484.4
TOTAL	20144.4	5163.3	4887.3	5118.0	4963.1

TABLE C.16 1978 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN78-DEC78	WINTER DEC77-FEB78	SPRING MAR78-MAY78	SUMMER JUN78-AUG78	FALL SEP78-NOV78
REGION 1						
	UTILITY	89.2	27.5	20.4	21.6	21.0
	IND FUEL COMB	39.4	10.0	9.8	9.8	9.9
	COM/INST/RES	33.9	15.2	8.8	2.6	7.3
	IND PROC	1.9	0.4	0.5	0.5	0.5
	TRANSPORTATION	357.6	81.5	85.7	98.0	92.3
	MISCELLANEOUS	61.4	20.9	15.6	10.3	14.3
	TOTAL	583.5	155.4	140.7	142.8	145.4
REGION 2						
	UTILITY	203.7	56.7	46.8	55.8	46.3
	IND FUEL COMB	229.4	57.8	57.4	56.8	57.5
	COM/INST/RES	125.2	55.2	31.9	10.4	27.6
	IND PROC	19.1	4.2	4.9	5.1	4.9
	TRANSPORTATION	575.9	131.8	139.2	157.0	147.9
	MISCELLANEOUS	114.7	39.4	28.9	18.9	27.0
	TOTAL	1267.9	345.0	309.1	304.0	311.2
REGION 3						
	UTILITY	699.9	173.4	163.1	180.3	179.6
	IND FUEL COMB	186.1	46.9	46.8	45.9	46.5
	COM/INST/RES	72.8	28.3	17.9	9.5	17.2
	IND PROC	80.2	18.1	20.9	20.8	20.1
	TRANSPORTATION	753.3	171.8	184.8	203.3	193.1
	MISCELLANEOUS	191.0	56.7	47.7	39.3	46.6
	TOTAL	1983.4	495.3	481.1	499.1	503.1
REGION 4						
	UTILITY	1239.2	313.9	265.9	356.7	303.3
	IND FUEL COMB	444.7	112.6	111.1	109.3	111.2
	COM/INST/RES	136.1	50.6	31.8	22.8	30.2
	IND PROC	126.5	30.2	33.2	31.3	31.7
	TRANSPORTATION	1399.4	330.8	352.3	366.8	348.8
	MISCELLANEOUS	315.3	86.1	77.8	73.0	77.2
	TOTAL	3661.2	924.1	872.2	959.9	902.3
REGION 5						
	UTILITY	1551.9	395.4	358.5	406.6	387.3
	IND FUEL COMB	390.2	100.5	98.0	94.9	96.9
	COM/INST/RES	143.2	63.4	36.5	11.8	31.4
	IND PROC	121.1	27.8	32.0	30.8	30.0
	TRANSPORTATION	1512.6	345.0	368.8	408.4	389.6
	MISCELLANEOUS	377.5	114.5	95.0	75.7	90.8
	TOTAL	4096.5	1046.7	988.7	1028.1	1026.0

TABLE C.16 (Cont'd)

		ANNUAL JAN78-DEC78	WINTER DEC77-FEB78	SPRING MAR78-MAY78	SUMMER JUN78-AUG78	FALL SEP78-NOV78
REGION 6						
	UTILITY	690.7	157.0	153.3	210.7	163.7
	IND FUEL COMB	1815.8	479.6	454.4	434.4	447.3
	COM/INST/RES	101.0	54.1	20.6	6.4	19.9
	IND PROC	222.0	53.9	56.9	55.5	55.6
	TRANSPORTATION	1043.1	248.7	261.5	273.3	258.5
	MISCELLANEOUS	354.1	94.9	87.3	83.6	87.1
	TOTAL	4226.7	1088.2	1033.9	1063.9	1032.1
REGION 7						
	UTILITY	398.6	109.4	81.9	110.5	95.2
	IND FUEL COMB	245.2	66.3	61.3	57.7	60.0
	COM/INST/RES	36.8	17.7	8.5	2.6	7.9
	IND PROC	51.1	11.9	13.0	13.1	13.0
	TRANSPORTATION	496.7	112.2	121.4	135.3	127.2
	MISCELLANEOUS	138.5	41.3	34.1	29.2	33.4
	TOTAL	1366.9	358.7	320.2	348.5	336.7
REGION 8						
	UTILITY	274.0	70.7	61.2	71.4	69.2
	IND FUEL COMB	133.7	34.8	33.5	32.4	33.0
	COM/INST/RES	30.7	12.3	8.2	3.0	7.2
	IND PROC	17.1	3.6	4.3	4.7	4.5
	TRANSPORTATION	279.2	61.7	65.2	79.0	72.9
	MISCELLANEOUS	180.7	46.5	45.4	43.2	45.0
	TOTAL	915.3	229.6	217.7	233.6	231.8
REGION 9						
	UTILITY	190.9	43.0	34.8	55.3	53.4
	IND FUEL COMB	164.2	42.6	41.2	39.8	40.6
	COM/INST/RES	49.2	19.7	12.6	6.3	10.5
	IND PROC	96.3	22.2	24.6	24.9	24.4
	TRANSPORTATION	902.2	211.4	223.8	241.7	224.8
	MISCELLANEOUS	202.3	54.5	50.8	46.8	49.5
	TOTAL	1605.1	393.5	387.8	414.7	403.3
REGION 10						
	UTILITY	28.8	10.7	6.0	2.4	9.7
	IND FUEL COMB	93.1	22.8	23.3	23.2	23.3
	COM/INST/RES	19.1	8.0	4.5	2.3	4.4
	IND PROC	21.9	5.2	5.7	5.4	5.5
	TRANSPORTATION	292.7	65.5	72.7	80.2	74.0
	MISCELLANEOUS	131.6	33.4	32.8	32.2	32.8
	TOTAL	587.3	145.6	144.9	145.7	149.8

TABLE C.16 (Cont'd)

	ANNUAL JAN78-DEC78	WINTER DEC77-FEB78	SPRING MAR78-MAY78	SUMMER JUN78-AUG78	FALL SEP78-NOV78
REGION TOTAL					
UTILITY	5367.0	1357.6	1191.7	1471.3	1328.7
IND FUEL COMB	3741.9	973.9	936.8	904.2	926.2
COM/INST/RES	748.1	324.5	181.1	77.5	163.6
IND PROC	757.1	177.5	196.0	192.0	190.3
TRANSPORTATION	7612.7	1760.5	1875.4	2043.0	1929.2
MISCELLANEOUS	2067.0	588.2	515.3	452.3	503.6
TOTAL	20293.8	5182.3	4896.3	5140.3	5041.6

TABLE C.17 1979 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN79-DEC79	WINTER DEC78-FEB79	SPRING MAR79-MAY79	SUMMER JUN79-AUG79	FALL SEP79-NOV79
REGION 1						
	UTILITY	94.0	27.2	23.8	22.1	21.2
	IND FUEL COMB	33.5	8.9	8.3	8.3	8.4
	COM/INST/RES	30.3	14.1	7.8	2.4	6.5
	IND PROC	1.9	0.4	0.5	0.5	0.5
	TRANSPORTATION	341.1	79.2	81.7	93.3	88.1
	MISCELLANEOUS	62.5	21.4	15.9	10.5	14.6
	TOTAL	563.3	151.3	138.1	137.1	139.3
REGION 2						
	UTILITY	194.6	49.8	45.0	54.5	45.6
	IND FUEL COMB	209.5	54.3	52.5	51.9	52.6
	COM/INST/RES	111.9	51.3	28.5	9.5	24.6
	IND PROC	19.8	4.4	5.1	5.3	5.1
	TRANSPORTATION	545.9	127.4	132.0	148.7	140.2
	MISCELLANEOUS	116.8	40.4	29.4	19.3	27.5
	TOTAL	1198.6	327.5	292.5	289.1	295.6
REGION 3						
	UTILITY	758.5	192.7	185.6	199.8	177.1
	IND FUEL COMB	182.3	46.2	45.9	45.0	45.6
	COM/INST/RES	69.7	27.4	17.1	9.2	16.5
	IND PROC	79.9	18.3	20.7	20.7	20.1
	TRANSPORTATION	723.0	167.7	177.4	194.9	185.5
	MISCELLANEOUS	194.7	58.2	48.6	40.1	47.4
	TOTAL	2008.1	510.5	495.3	509.7	492.2
REGION 4						
	UTILITY	1267.3	319.5	287.6	365.5	293.7
	IND FUEL COMB	433.1	111.1	108.3	106.5	108.2
	COM/INST/RES	133.1	50.2	31.2	22.6	29.7
	IND PROC	126.7	30.3	33.2	31.4	31.7
	TRANSPORTATION	1347.3	323.3	339.3	352.8	335.9
	MISCELLANEOUS	321.3	88.3	79.3	74.4	78.7
	TOTAL	3628.8	922.8	879.0	953.2	877.9
REGION 5						
	UTILITY	1537.7	411.2	363.2	388.9	378.0
	IND FUEL COMB	389.1	100.2	97.7	94.7	96.6
	COM/INST/RES	141.8	63.1	36.1	11.7	31.1
	IND PROC	115.4	27.3	30.5	29.4	28.7
	TRANSPORTATION	1457.1	337.9	355.3	392.7	375.4
	MISCELLANEOUS	384.7	117.5	96.8	77.1	92.5
	TOTAL	4025.9	1057.2	979.6	994.5	1002.4

TABLE C.17 (Cont'd)

		ANNUAL JAN79-DEC79	WINTER DEC78-FEB79	SPRING MAR79-MAY79	SUMMER JUN79-AUG79	FALL SEP79-NOV79
REGION 6						
	UTILITY	710.3	167.5	158.2	207.6	175.2
	IND FUEL COMB	1748.4	467.8	437.5	418.2	430.7
	COM/INST/RES	91.4	50.9	18.6	5.8	18.0
	IND PROC	219.0	53.5	56.1	54.8	54.8
	TRANSPORTATION	1016.2	245.7	254.8	266.1	252.0
	MISCELLANEOUS	360.8	97.4	88.9	85.2	88.8
	TOTAL	4146.1	1082.8	1014.1	1037.5	1019.4
REGION 7						
	UTILITY	410.1	117.9	90.5	108.5	96.9
	IND FUEL COMB	238.4	65.0	59.6	56.2	58.3
	COM/INST/RES	36.7	17.7	8.5	2.6	7.8
	IND PROC	53.0	12.2	13.5	13.5	13.5
	TRANSPORTATION	483.9	111.0	118.4	131.6	123.9
	MISCELLANEOUS	141.1	42.4	34.7	29.7	34.0
	TOTAL	1363.1	366.2	325.2	342.1	334.5
REGION 8						
	UTILITY	305.9	78.0	67.0	77.1	80.0
	IND FUEL COMB	130.2	34.2	32.6	31.6	32.2
	COM/INST/RES	30.1	12.2	8.0	2.9	7.0
	IND PROC	16.9	3.6	4.2	4.6	4.4
	TRANSPORTATION	274.6	61.5	64.1	77.5	71.8
	MISCELLANEOUS	184.1	47.7	46.2	44.0	45.8
	TOTAL	941.7	237.1	222.2	237.7	241.2
REGION 9						
	UTILITY	234.7	57.3	47.6	66.3	63.5
	IND FUEL COMB	154.2	41.0	38.7	37.3	38.1
	COM/INST/RES	47.6	19.4	12.2	6.0	10.2
	IND PROC	93.6	22.0	23.9	24.2	23.8
	TRANSPORTATION	867.8	206.7	215.3	232.3	216.2
	MISCELLANEOUS	206.2	55.9	51.8	47.7	50.4
	TOTAL	1604.1	402.2	389.5	413.9	402.2
REGION 10						
	UTILITY	36.8	11.3	10.4	6.9	7.6
	IND FUEL COMB	93.3	23.3	23.3	23.3	23.4
	COM/INST/RES	17.1	7.4	4.0	2.0	4.0
	IND PROC	21.8	5.2	5.7	5.4	5.5
	TRANSPORTATION	283.9	64.5	70.6	77.7	71.8
	MISCELLANEOUS	134.1	34.2	33.4	32.8	33.4
	TOTAL	587.0	146.1	147.4	148.1	145.6

TABLE C.17 (Cont'd)

	ANNUAL JAN79-DEC79	WINTER DEC78-FEB79	SPRING MAR79-MAY79	SUMMER JUN79-AUG79	FALL SEP79-NOV79
REGION TOTAL					
UTILITY	5549.9	1432.4	1278.9	1497.2	1338.8
IND FUEL COMB	3612.0	952.1	904.3	872.8	894.0
COM/INST/RES	709.7	313.8	172.0	74.7	155.4
IND PROC	748.0	177.2	193.4	189.8	188.2
TRANSPORTATION	7340.9	1724.8	1809.0	1967.6	1860.7
MISCELLANEOUS	2106.3	603.4	525.1	460.9	513.2
TOTAL	20066.7	5203.6	4882.6	5063.0	4950.3

TABLE C.18 1980 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN80-DEC80	WINTER DEC79-FEB80	SPRING MAR80-MAY80	SUMMER JUN80-AUG80	FALL SEP80-NOV80
REGION 1						
	UTILITY	105.8	30.0	24.5	25.5	24.5
	IND FUEL COMB	28.7	7.8	7.2	6.8	7.2
	COM/INST/RES	28.8	13.1	7.4	2.2	6.2
	IND PROC	1.8	0.4	0.4	0.5	0.5
	TRANSPORTATION	331.2	82.0	80.4	84.0	84.5
	MISCELLANEOUS	58.4	20.6	14.8	9.8	13.7
	TOTAL	554.8	153.9	134.8	128.9	136.5
REGION 2						
	UTILITY	207.1	52.4	47.1	57.2	48.3
	IND FUEL COMB	176.5	48.8	44.4	41.2	44.1
	COM/INST/RES	107.1	47.8	27.3	9.2	23.6
	IND PROC	16.6	4.0	4.2	4.2	4.3
	TRANSPORTATION	526.6	131.1	128.7	134.4	134.4
	MISCELLANEOUS	109.2	38.9	27.5	18.0	25.7
	TOTAL	1143.1	322.9	279.2	264.2	280.3
REGION 3						
	UTILITY	763.2	203.1	176.6	197.6	185.0
	IND FUEL COMB	155.0	42.8	39.2	35.5	38.8
	COM/INST/RES	69.4	26.6	17.0	9.6	16.4
	IND PROC	68.6	17.1	17.6	16.7	17.6
	TRANSPORTATION	706.9	174.2	170.4	183.8	180.5
	MISCELLANEOUS	181.9	56.0	45.4	37.5	44.3
	TOTAL	1945.1	519.8	466.2	480.6	482.6
REGION 4						
	UTILITY	1352.1	331.1	300.1	386.1	319.8
	IND FUEL COMB	375.0	102.8	94.0	88.3	93.5
	COM/INST/RES	137.4	49.8	32.4	24.2	30.9
	IND PROC	120.8	30.1	31.1	29.2	30.1
	TRANSPORTATION	1321.6	331.6	331.2	331.3	330.3
	MISCELLANEOUS	300.3	85.0	74.1	69.6	73.5
	TOTAL	3607.2	930.4	863.0	928.7	878.2
REGION 5						
	UTILITY	1580.0	426.0	373.4	406.0	368.2
	IND FUEL COMB	330.3	92.6	83.4	75.4	82.1
	COM/INST/RES	134.8	60.7	34.3	11.2	29.6
	IND PROC	104.3	26.0	27.1	24.7	26.4
	TRANSPORTATION	1430.2	354.6	347.7	357.0	365.4
	MISCELLANEOUS	359.5	113.1	90.5	72.1	86.5
	TOTAL	3939.2	1073.1	956.4	946.3	958.2

TABLE C.18 (Cont'd)

		ANNUAL JAN80-DEC80	WINTER DEC79-FEB80	SPRING MAR80-MAY80	SUMMER JUN80-AUG80	FALL SEP80-NOV80
REGION 6						
	UTILITY	793.7	173.1	168.4	248.5	198.0
	IND FUEL COMB	1450.8	420.9	364.7	331.7	354.9
	COM/INST/RES	86.7	47.4	17.6	5.5	17.0
	IND PROC	205.4	53.1	52.5	49.5	50.6
	TRANSPORTATION	1009.6	255.4	249.4	256.2	245.1
	MISCELLANEOUS	337.2	93.7	83.1	79.6	82.9
	TOTAL	3883.5	1043.6	935.7	970.9	948.5
REGION 7						
	UTILITY	433.1	110.9	98.6	128.1	95.8
	IND FUEL COMB	198.3	58.4	49.7	45.2	48.2
	COM/INST/RES	34.7	17.1	8.0	2.5	7.4
	IND PROC	46.9	11.8	11.8	11.6	11.9
	TRANSPORTATION	480.6	119.1	115.7	121.1	124.8
	MISCELLANEOUS	131.9	40.8	32.4	27.8	31.8
	TOTAL	1325.5	358.0	316.3	336.2	319.9
REGION 8						
	UTILITY	317.0	88.2	70.3	76.9	81.0
	IND FUEL COMB	109.9	30.9	27.6	25.9	27.0
	COM/INST/RES	28.6	11.7	7.6	2.8	6.7
	IND PROC	15.4	3.5	3.8	4.1	4.0
	TRANSPORTATION	275.4	68.3	62.8	68.0	74.4
	MISCELLANEOUS	172.0	46.0	43.2	41.1	42.8
	TOTAL	918.2	248.5	215.4	218.8	236.0
REGION 9						
	UTILITY	218.0	57.4	49.0	58.3	56.1
	IND FUEL COMB	130.7	37.0	33.0	30.2	32.1
	COM/INST/RES	45.0	18.5	11.5	5.7	9.6
	IND PROC	87.2	21.7	22.1	21.5	22.0
	TRANSPORTATION	850.4	211.3	211.6	213.7	213.9
	MISCELLANEOUS	192.7	53.8	48.4	44.6	47.1
	TOTAL	1524.0	399.6	375.6	374.0	380.9
REGION 10						
	UTILITY	36.7	12.1	8.2	4.5	12.9
	IND FUEL COMB	88.0	22.7	22.0	21.7	22.0
	COM/INST/RES	16.3	6.9	3.8	1.9	3.8
	IND PROC	21.4	5.3	5.5	5.2	5.3
	TRANSPORTATION	280.8	68.4	69.0	70.9	71.3
	MISCELLANEOUS	125.4	33.0	31.3	30.7	31.2
	TOTAL	568.6	148.2	139.8	134.9	146.6

TABLE C.18 (Cont'd)

	ANNUAL JAN80-DEC80	WINTER DEC79-FEB80	SPRING MAR80-MAY80	SUMMER JUN80-AUG80	FALL SEP80-NOV80
REGION TOTAL					
UTILITY	5806.7	1484.2	1316.3	1588.7	1389.5
IND FUEL COMB	3043.3	864.8	765.3	701.8	750.1
COM/INST/RES	688.8	299.6	167.0	74.9	151.4
IND PROC	688.4	173.0	176.1	167.1	172.6
TRANSPORTATION	7213.4	1795.7	1767.0	1820.3	1824.5
MISCELLANEOUS	1968.6	580.7	490.8	430.7	479.6
TOTAL	19409.1	5198.0	4682.3	4783.5	4767.7

TABLE C.19 1981 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN81-DEC81	WINTER DEC80-FEB81	SPRING MAR81-MAY81	SUMMER JUN81-AUG81	FALL SEP81-NOV81
REGION 1						
	UTILITY	94.7	27.2	19.9	24.0	23.4
	IND FUEL COMB	26.4	7.0	6.7	6.6	6.5
	COM/INST/RES	25.2	11.8	6.5	2.0	5.4
	IND PROC	1.8	0.4	0.5	0.5	0.4
	TRANSPORTATION	333.3	83.8	77.9	85.7	86.8
	MISCELLANEOUS	57.3	19.9	14.5	9.6	13.4
	TOTAL	538.6	150.1	125.9	128.4	136.0
REGION 2						
	UTILITY	204.8	51.7	52.2	56.8	46.0
	IND FUEL COMB	170.4	44.6	43.6	43.0	41.5
	COM/INST/RES	94.4	43.2	24.1	8.3	20.8
	IND PROC	16.9	3.9	4.4	4.5	4.2
	TRANSPORTATION	526.6	131.5	121.6	139.2	133.9
	MISCELLANEOUS	107.0	37.5	27.0	17.7	25.2
	TOTAL	1120.1	312.3	272.8	269.5	271.6
REGION 3						
	UTILITY	747.2	201.6	176.2	198.9	174.4
	IND FUEL COMB	159.5	41.2	40.9	40.4	38.7
	COM/INST/RES	65.6	25.2	16.1	9.3	15.6
	IND PROC	68.0	16.2	18.0	18.0	16.6
	TRANSPORTATION	715.5	177.1	169.3	183.9	183.7
	MISCELLANEOUS	178.3	54.0	44.5	36.7	43.5
	TOTAL	1934.2	515.3	465.0	487.2	472.5
REGION 4						
	UTILITY	1379.2	355.8	309.0	400.3	318.8
	IND FUEL COMB	370.8	96.5	94.1	92.6	90.9
	COM/INST/RES	133.0	48.3	31.4	23.9	30.1
	IND PROC	115.2	29.1	30.6	28.7	28.3
	TRANSPORTATION	1341.7	333.3	329.3	347.3	331.1
	MISCELLANEOUS	294.3	81.9	72.7	68.2	72.1
	TOTAL	3634.1	945.0	867.1	961.0	871.3
REGION 5						
	UTILITY	1531.6	419.0	368.2	390.7	364.9
	IND FUEL COMB	340.6	88.9	87.0	84.9	82.7
	COM/INST/RES	128.2	57.6	32.6	10.7	28.2
	IND PROC	101.0	24.7	27.1	26.4	24.4
	TRANSPORTATION	1452.6	371.1	336.3	373.0	381.9
	MISCELLANEOUS	352.3	109.0	88.7	70.6	84.7
	TOTAL	3906.4	1070.4	940.0	956.3	966.8

TABLE C.19 (Cont'd)

		ANNUAL JAN81-DEC81	WINTER DEC80-FEB81	SPRING MAR81-MAY81	SUMMER JUN81-AUG81	FALL SEP81-NOV81
REGION 6						
	UTILITY	836.1	186.4	186.6	258.5	200.9
	IND FUEL COMB	1391.4	378.6	351.3	339.0	337.2
	COM/INST/RES	76.7	43.1	15.6	4.8	15.1
	IND PROC	187.6	48.5	48.3	47.1	46.3
	TRANSPORTATION	1036.2	260.1	252.8	267.5	254.4
	MISCELLANEOUS	330.5	90.3	81.4	78.0	81.3
	TOTAL	3858.5	1007.0	936.1	995.0	935.2
REGION 7						
	UTILITY	437.1	105.6	97.0	124.8	103.9
	IND FUEL COMB	193.9	53.1	48.9	46.5	46.9
	COM/INST/RES	33.0	16.2	7.7	2.4	7.1
	IND PROC	44.1	11.0	11.5	11.3	10.9
	TRANSPORTATION	493.2	122.6	116.0	126.4	126.2
	MISCELLANEOUS	129.2	39.3	31.8	27.2	31.2
	TOTAL	1330.5	347.8	312.9	338.5	326.2
REGION 8						
	UTILITY	339.8	87.1	81.0	81.6	86.2
	IND FUEL COMB	109.8	28.8	27.7	26.9	26.9
	COM/INST/RES	27.0	11.0	7.2	2.7	6.3
	IND PROC	14.4	3.3	3.7	3.9	3.7
	TRANSPORTATION	285.0	66.5	62.5	77.1	79.3
	MISCELLANEOUS	168.6	44.3	42.4	40.3	42.0
	TOTAL	944.6	241.0	224.4	232.5	244.3
REGION 9						
	UTILITY	248.2	53.6	58.0	73.8	62.7
	IND FUEL COMB	124.9	33.6	31.7	30.7	30.4
	COM/INST/RES	41.9	17.3	10.7	5.3	9.0
	IND PROC	80.0	19.8	20.7	20.7	19.9
	TRANSPORTATION	862.5	211.8	211.7	221.6	217.5
	MISCELLANEOUS	188.8	51.8	47.4	43.7	46.2
	TOTAL	1546.4	388.0	380.3	395.9	385.6
REGION 10						
	UTILITY	40.1	9.6	8.4	5.0	15.1
	IND FUEL COMB	84.3	21.6	21.2	21.1	21.0
	COM/INST/RES	14.4	6.2	3.3	1.7	3.3
	IND PROC	20.4	5.1	5.4	5.1	5.1
	TRANSPORTATION	287.1	67.9	71.7	76.3	70.9
	MISCELLANEOUS	122.9	31.8	30.6	30.0	30.6
	TOTAL	569.1	142.2	140.6	139.3	146.0

TABLE C.19 (Cont'd)

	ANNUAL JAN81-DEC81	WINTER DEC80-FEB81	SPRING MAR81-MAY81	SUMMER JUN81-AUG81	FALL SEP81-NOV81
REGION TOTAL					
UTILITY	5858.9	1497.6	1356.6	1614.4	1396.2
IND FUEL COMB	2972.0	793.9	753.0	731.5	722.7
COM/INST/RES	639.4	279.9	155.2	71.2	141.0
IND PROC	649.3	161.9	170.3	166.2	159.7
TRANSPORTATION	7333.7	1825.7	1749.1	1898.2	1865.8
MISCELLANEOUS	1929.2	559.9	481.0	422.1	470.0
TOTAL	19382.5	5119.0	4665.1	4903.6	4755.4

TABLE C.20 1982 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN82-DEC82	WINTER DEC81-FEB82	SPRING MAR82-MAY82	SUMMER JUN82-AUG82	FALL SEP82-NOV82
REGION 1						
	UTILITY	107.3	30.6	23.3	24.9	28.7
	IND FUEL COMB	27.2	6.7	6.8	6.7	6.8
	COM/INST/RES	24.6	11.1	6.4	1.9	5.3
	IND PROC	1.6	0.3	0.4	0.4	0.4
	TRANSPORTATION	320.7	72.7	79.0	85.3	84.0
	MISCELLANEOUS	54.4	19.1	13.8	9.1	12.7
	TOTAL	535.8	140.6	129.7	128.5	138.0
REGION 2						
	UTILITY	198.0	50.3	46.8	52.0	47.6
	IND FUEL COMB	175.7	43.3	44.1	43.5	43.6
	COM/INST/RES	92.2	40.6	23.5	8.1	20.3
	IND PROC	13.9	3.2	3.6	3.7	3.5
	TRANSPORTATION	507.6	114.7	126.1	135.7	131.9
	MISCELLANEOUS	101.5	35.9	25.6	16.8	23.9
	TOTAL	1088.9	288.0	269.7	259.8	270.7
REGION 3						
	UTILITY	714.3	198.2	178.8	181.7	160.5
	IND FUEL COMB	161.6	40.6	40.9	39.8	39.5
	COM/INST/RES	65.4	24.6	16.0	9.3	15.6
	IND PROC	55.8	13.4	14.7	14.6	13.8
	TRANSPORTATION	687.3	155.6	174.4	183.4	175.6
	MISCELLANEOUS	169.2	51.8	42.2	34.8	41.2
	TOTAL	1853.6	484.3	467.0	463.7	446.2
REGION 4						
	UTILITY	1253.6	329.1	292.2	357.2	291.9
	IND FUEL COMB	374.4	94.4	93.8	92.0	92.9
	COM/INST/RES	133.1	47.5	31.5	23.9	30.2
	IND PROC	94.1	23.9	25.5	23.5	23.0
	TRANSPORTATION	1287.7	299.5	327.7	336.5	324.9
	MISCELLANEOUS	279.2	78.6	69.0	64.7	68.4
	TOTAL	3422.2	873.0	839.6	897.9	831.2
REGION 5						
	UTILITY	1455.3	409.1	351.7	367.1	336.6
	IND FUEL COMB	345.2	88.9	87.0	83.9	84.1
	COM/INST/RES	130.2	57.2	33.2	10.9	28.7
	IND PROC	82.4	20.3	22.0	21.3	20.1
	TRANSPORTATION	1394.0	308.7	351.4	377.6	355.9
	MISCELLANEOUS	334.3	104.6	84.1	67.0	80.4
	TOTAL	3741.4	988.8	929.5	927.9	905.7

TABLE C.20 (Cont'd)

		ANNUAL JAN82-DEC82	WINTER DEC81-FEB82	SPRING MAR82-MAY82	SUMMER JUN82-AUG82	FALL SEP82-NOV82
REGION 6						
	UTILITY	884.7	200.1	195.2	266.5	218.1
	IND FUEL COMB	1447.3	379.8	362.3	346.2	353.2
	COM/INST/RES	75.4	40.8	15.3	4.8	14.8
	IND PROC	162.6	41.4	42.1	41.1	40.2
	TRANSPORTATION	991.5	237.9	251.2	259.8	250.8
	MISCELLANEOUS	313.6	86.7	77.3	74.1	77.1
	TOTAL	3875.1	986.6	943.4	992.4	954.3
REGION 7						
	UTILITY	425.0	114.8	89.7	121.6	103.1
	IND FUEL COMB	200.7	54.1	50.1	47.3	48.8
	COM/INST/RES	33.7	16.1	7.8	2.4	7.2
	IND PROC	36.8	8.9	9.6	9.5	9.3
	TRANSPORTATION	472.0	106.1	118.9	128.8	120.7
	MISCELLANEOUS	122.6	37.7	30.2	25.9	29.6
	TOTAL	1290.8	337.7	306.2	335.4	318.7
REGION 8						
	UTILITY	352.9	102.1	78.0	83.6	91.0
	IND FUEL COMB	112.3	29.3	28.1	27.2	27.5
	COM/INST/RES	27.3	10.9	7.3	2.7	6.4
	IND PROC	12.9	2.8	3.3	3.6	3.4
	TRANSPORTATION	272.1	62.0	65.9	76.7	68.8
	MISCELLANEOUS	160.0	42.5	40.2	38.2	39.8
	TOTAL	937.6	249.5	222.7	232.0	236.9
REGION 9						
	UTILITY	218.2	50.9	50.5	61.6	54.6
	IND FUEL COMB	128.5	33.4	32.2	31.1	31.4
	COM/INST/RES	42.3	17.1	10.8	5.4	9.0
	IND PROC	70.3	16.9	18.0	18.4	17.7
	TRANSPORTATION	828.0	194.8	205.4	224.3	206.9
	MISCELLANEOUS	179.2	49.7	45.0	41.5	43.8
	TOTAL	1466.6	362.8	362.0	382.3	363.4
REGION 10						
	UTILITY	29.0	13.6	3.4	2.9	10.9
	IND FUEL COMB	81.5	20.6	20.4	20.3	20.3
	COM/INST/RES	14.1	5.9	3.3	1.7	3.3
	IND PROC	18.3	4.5	4.8	4.6	4.6
	TRANSPORTATION	275.0	62.1	69.1	75.0	70.6
	MISCELLANEOUS	116.6	30.5	29.1	28.5	29.1
	TOTAL	534.4	137.2	130.1	133.0	138.7

TABLE C.20 (Cont'd)

	ANNUAL JAN82-DEC82	WINTER DEC81-FEB82	SPRING MAR82-MAY82	SUMMER JUN82-AUG82	FALL SEP82-NOV82
REGION TOTAL					
UTILITY	5638.3	1498.8	1309.6	1519.2	1343.0
IND FUEL COMB	3054.4	791.1	765.7	738.1	748.0
COM/INST/RES	638.4	271.7	154.9	71.2	140.8
IND PROC	548.8	135.7	144.0	140.7	136.0
TRANSPORTATION	7035.9	1614.1	1769.1	1883.1	1790.1
MISCELLANEOUS	1830.8	537.2	456.4	400.6	446.1
TOTAL	18746.5	4848.5	4599.8	4752.8	4603.9

TABLE C.21 1983 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN83-DEC83	WINTER DEC82-FEB83	SPRING MAR83-MAY83	SUMMER JUN83-AUG83	FALL SEP83-NOV83
REGION 1						
	UTILITY	111.2	29.9	24.9	29.1	26.2
	IND FUEL COMB	22.1	5.8	5.4	5.6	5.7
	COM/INST/RES	21.7	10.1	5.6	1.7	4.7
	IND PROC	1.7	0.4	0.4	0.5	0.5
	TRANSPORTATION	314.0	68.8	75.9	90.1	81.4
	MISCELLANEOUS	50.9	17.9	12.9	8.5	11.9
	TOTAL	521.6	132.9	125.1	135.6	130.4
REGION 2						
	UTILITY	209.7	51.7	46.8	60.4	50.2
	IND FUEL COMB	151.2	37.7	36.7	38.3	39.7
	COM/INST/RES	82.2	37.1	20.9	7.5	18.2
	IND PROC	14.9	3.1	3.8	4.0	4.0
	TRANSPORTATION	499.4	107.7	122.4	144.1	126.7
	MISCELLANEOUS	95.0	33.8	23.9	15.7	22.4
	TOTAL	1052.5	271.1	254.6	270.0	261.2
REGION 3						
	UTILITY	748.4	180.8	165.1	205.0	185.2
	IND FUEL COMB	149.1	35.7	36.2	37.7	39.4
	COM/INST/RES	63.8	23.8	15.6	9.6	15.2
	IND PROC	59.0	12.5	14.8	15.8	15.6
	TRANSPORTATION	669.8	143.6	167.5	188.3	172.9
	MISCELLANEOUS	158.3	48.7	39.5	32.6	38.6
	TOTAL	1848.4	445.1	438.6	488.8	467.0
REGION 4						
	UTILITY	1275.6	298.3	271.0	377.6	313.1
	IND FUEL COMB	341.4	85.5	83.3	85.3	88.3
	COM/INST/RES	135.9	47.2	32.3	25.5	31.1
	IND PROC	87.9	20.2	22.5	21.9	23.3
	TRANSPORTATION	1252.0	290.8	319.6	334.0	310.9
	MISCELLANEOUS	261.2	73.9	64.5	60.5	64.0
	TOTAL	3353.9	815.9	793.3	904.9	830.8
REGION 5						
	UTILITY	1499.5	360.2	334.6	403.7	375.0
	IND FUEL COMB	320.7	78.5	77.9	79.7	83.7
	COM/INST/RES	121.6	54.9	31.0	10.3	26.8
	IND PROC	83.0	17.8	20.9	21.9	22.0
	TRANSPORTATION	1354.7	291.3	336.5	382.9	349.4
	MISCELLANEOUS	312.8	98.3	78.7	62.7	75.2
	TOTAL	3692.4	901.1	879.6	961.2	932.1

TABLE C.21 (Cont'd)

		ANNUAL JAN83-DEC83	WINTER DEC82-FEB83	SPRING MAR83-MAY83	SUMMER JUN83-AUG83	FALL SEP83-NOV83
REGION 6						
	UTILITY	957.0	211.8	206.3	283.0	241.3
	IND FUEL COMB	1258.4	331.1	308.0	304.4	320.8
	COM/INST/RES	66.8	37.5	13.5	4.2	13.1
	IND PROC	160.5	37.1	40.2	40.9	42.2
	TRANSPORTATION	955.5	224.3	243.6	253.6	238.1
	MISCELLANEOUS	293.4	81.5	72.3	69.3	72.2
	TOTAL	3691.7	923.3	883.9	955.5	927.7
REGION 7						
	UTILITY	453.6	101.4	94.7	138.8	111.6
	IND FUEL COMB	177.4	47.5	43.4	42.1	44.6
	COM/INST/RES	31.3	15.5	7.3	2.3	6.7
	IND PROC	38.1	8.3	9.4	10.0	10.2
	TRANSPORTATION	454.9	98.0	114.0	128.7	115.6
	MISCELLANEOUS	114.7	35.5	28.2	24.2	27.7
	TOTAL	1270.1	306.2	297.0	346.1	316.5
REGION 8						
	UTILITY	344.0	89.2	74.8	86.1	91.4
	IND FUEL COMB	101.4	26.2	25.0	24.9	25.6
	COM/INST/RES	25.3	10.4	6.7	2.6	5.9
	IND PROC	13.6	2.7	3.4	3.8	3.7
	TRANSPORTATION	260.5	56.2	62.3	76.9	67.2
	MISCELLANEOUS	149.7	40.0	37.6	35.8	37.2
	TOTAL	894.6	224.7	209.8	230.0	231.2
REGION 9						
	UTILITY	192.7	47.3	42.0	55.0	49.9
	IND FUEL COMB	111.8	28.8	27.4	27.4	28.6
	COM/INST/RES	38.8	16.1	9.9	4.9	8.3
	IND PROC	71.3	15.6	17.7	19.0	19.0
	TRANSPORTATION	805.6	179.9	199.0	227.9	201.5
	MISCELLANEOUS	167.7	46.8	42.1	38.8	41.0
	TOTAL	1387.9	334.5	338.1	373.0	348.3
REGION 10						
	UTILITY	31.1	8.9	4.3	6.7	11.0
	IND FUEL COMB	77.8	19.5	19.3	19.5	19.7
	COM/INST/RES	12.5	5.4	2.9	1.5	2.9
	IND PROC	17.6	4.1	4.5	4.4	4.6
	TRANSPORTATION	265.9	57.9	66.4	76.4	67.2
	MISCELLANEOUS	109.1	28.7	27.2	26.7	27.2
	TOTAL	513.9	124.4	124.6	135.2	132.6

TABLE C.21 (Cont'd)

	ANNUAL JAN83-DEC83	WINTER DEC82-FEB83	SPRING MAR83-MAY83	SUMMER JUN83-AUG83	FALL SEP83-NOV83
REGION TOTAL					
UTILITY	5823.0	1379.6	1264.5	1645.3	1455.0
IND FUEL COMB	2711.4	696.3	662.5	664.8	696.3
COM/INST/RES	599.9	257.9	145.8	70.0	133.0
IND PROC	547.7	121.7	137.6	142.3	145.1
TRANSPORTATION	6832.4	1518.6	1707.3	1903.0	1731.0
MISCELLANEOUS	1712.6	505.0	427.0	374.7	417.3
TOTAL	18227.0	4479.2	4344.6	4800.2	4577.6

TABLE C.22 1984 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN84-DEC84	WINTER DEC83-FEB84	SPRING MAR84-MAY84	SUMMER JUN84-AUG84	FALL SEP84-NOV84
REGION 1						
	UTILITY	124.8	30.9	28.9	34.4	30.5
	IND FUEL COMB	23.4	5.8	5.9	5.9	5.8
	COM/INST/RES	22.5	9.9	5.8	1.8	4.9
	IND PROC	2.0	0.4	0.5	0.5	0.5
	TRANSPORTATION	310.7	65.4	73.1	91.5	80.0
	MISCELLANEOUS	54.4	18.3	13.8	9.1	12.7
	TOTAL	537.8	130.7	128.0	143.2	134.5
REGION 2						
	UTILITY	208.3	52.4	44.4	60.3	51.4
	IND FUEL COMB	161.2	39.7	40.5	40.6	40.2
	COM/INST/RES	85.2	36.3	21.7	7.9	18.8
	IND PROC	15.9	3.4	4.1	4.3	4.1
	TRANSPORTATION	493.0	105.6	118.5	140.2	129.2
	MISCELLANEOUS	101.5	34.6	25.6	16.8	23.9
	TOTAL	1065.0	272.0	254.7	270.2	267.6
REGION 3						
	UTILITY	785.6	205.8	190.0	210.2	184.5
	IND FUEL COMB	163.0	39.9	41.1	41.1	40.5
	COM/INST/RES	67.2	24.2	16.4	10.1	16.1
	IND PROC	63.3	13.9	16.6	17.0	15.8
	TRANSPORTATION	664.4	143.3	163.9	186.0	171.7
	MISCELLANEOUS	169.2	49.8	42.2	34.8	41.2
	TOTAL	1912.6	477.0	470.1	499.1	469.8
REGION 4						
	UTILITY	1323.5	324.5	300.3	372.7	330.7
	IND FUEL COMB	374.0	92.6	93.8	93.4	93.0
	COM/INST/RES	139.1	47.8	33.1	25.8	31.8
	IND PROC	102.3	22.7	26.6	26.1	25.8
	TRANSPORTATION	1243.4	283.5	316.7	334.8	310.0
	MISCELLANEOUS	279.2	75.5	69.0	64.7	68.4
	TOTAL	3461.7	846.7	839.5	917.5	859.9
REGION 5						
	UTILITY	1562.5	425.1	370.2	414.9	373.7
	IND FUEL COMB	350.7	88.0	88.5	87.2	86.7
	COM/INST/RES	131.5	56.2	33.4	11.4	29.1
	IND PROC	91.6	20.2	24.5	24.2	22.5
	TRANSPORTATION	1345.8	289.6	330.6	382.8	345.8
	MISCELLANEOUS	334.3	100.5	84.1	67.0	80.4
	TOTAL	3816.4	979.6	931.3	987.6	938.2

TABLE C.22 (Cont'd)

		ANNUAL JAN84-DEC84	WINTER DEC83-FEB84	SPRING MAR84-MAY84	SUMMER JUN84-AUG84	FALL SEP84-NOV84
REGION 6						
	UTILITY	980.2	244.4	215.2	293.8	235.0
	IND FUEL COMB	1333.9	348.9	336.5	323.4	327.2
	COM/INST/RES	69.2	36.7	14.0	4.4	13.6
	IND PROC	170.5	39.9	43.8	43.4	42.6
	TRANSPORTATION	953.3	219.5	242.1	254.4	238.1
	MISCELLANEOUS	313.6	83.3	77.3	74.1	77.1
	TOTAL	3820.6	972.8	928.8	993.5	933.6
REGION 7						
	UTILITY	486.3	123.9	110.3	138.6	115.3
	IND FUEL COMB	189.4	50.7	47.8	45.2	46.2
	COM/INST/RES	33.5	15.7	7.7	2.5	7.2
	IND PROC	40.7	9.1	10.3	10.7	10.5
	TRANSPORTATION	453.8	96.7	111.8	131.4	115.5
	MISCELLANEOUS	122.6	36.3	30.2	25.9	29.6
	TOTAL	1326.3	332.4	318.1	354.3	324.2
REGION 8						
	UTILITY	403.9	103.4	87.2	102.2	106.0
	IND FUEL COMB	109.7	27.9	27.7	26.9	27.1
	COM/INST/RES	27.5	10.6	7.3	2.9	6.5
	IND PROC	14.4	2.9	3.6	4.0	3.7
	TRANSPORTATION	260.8	54.2	62.0	80.1	65.3
	MISCELLANEOUS	160.0	40.9	40.2	38.2	39.8
	TOTAL	976.3	239.9	228.1	254.4	248.4
REGION 9						
	UTILITY	219.9	48.3	46.4	66.0	58.4
	IND FUEL COMB	119.7	30.7	30.2	29.3	29.4
	COM/INST/RES	41.0	16.3	10.5	5.2	8.8
	IND PROC	75.4	16.8	19.4	19.9	19.0
	TRANSPORTATION	799.8	184.2	201.1	219.0	194.0
	MISCELLANEOUS	179.2	47.9	45.0	41.5	43.8
	TOTAL	1434.9	344.2	352.6	381.0	353.5
REGION 10						
	UTILITY	33.3	10.1	2.4	7.7	13.2
	IND FUEL COMB	89.1	21.4	22.3	22.3	22.2
	COM/INST/RES	13.0	5.3	3.0	1.6	3.0
	IND PROC	21.9	4.9	5.6	5.5	5.5
	TRANSPORTATION	264.8	57.8	66.4	75.2	66.1
	MISCELLANEOUS	116.6	29.3	29.1	28.5	29.1
	TOTAL	538.6	128.7	128.7	140.8	139.1

TABLE C.22 (Cont'd)

	ANNUAL JAN84-DEC84	WINTER DEC83-FEB84	SPRING MAR84-MAY84	SUMMER JUN84-AUG84	FALL SEP84-NOV84
REGION TOTAL					
UTILITY	6128.3	1569.0	1395.3	1700.7	1498.8
IND FUEL COMB	2914.0	745.6	734.1	715.4	718.5
COM/INST/RES	629.6	259.1	152.9	73.6	139.8
IND PROC	598.0	134.2	155.0	155.8	150.0
TRANSPORTATION	6789.8	1499.7	1686.2	1895.5	1715.7
MISCELLANEOUS	1830.8	516.3	456.4	400.6	446.1
TOTAL	18890.4	4724.0	4579.9	4941.6	4668.9

TABLE C.23 1985 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
REGION 1						
	UTILITY	125.4	32.8	27.5	32.4	31.5
	IND FUEL COMB	25.6	6.1	6.4	6.4	6.5
	COM/INST/RES	25.5	10.9	6.6	2.0	5.5
	IND PROC	2.0	0.4	0.5	0.5	0.5
	TRANSPORTATION	329.9	76.4	80.2	85.9	83.5
	MISCELLANEOUS	57.3	19.4	14.5	9.6	13.4
	TOTAL	565.7	146.1	135.7	136.9	140.9
REGION 2						
	UTILITY	203.8	54.7	47.2	55.1	47.4
	IND FUEL COMB	166.9	39.7	41.6	42.5	42.8
	COM/INST/RES	95.3	40.0	24.3	8.4	21.0
	IND PROC	15.7	3.3	4.1	4.3	4.1
	TRANSPORTATION	524.9	113.5	119.9	148.0	137.3
	MISCELLANEOUS	107.0	36.6	27.0	17.7	25.2
	TOTAL	1113.7	287.7	264.0	276.0	277.9
REGION 3						
	UTILITY	787.9	207.6	189.0	201.7	183.6
	IND FUEL COMB	165.9	40.0	42.0	41.8	42.1
	COM/INST/RES	66.1	24.8	16.2	9.4	15.7
	IND PROC	62.6	13.4	16.2	16.7	16.1
	TRANSPORTATION	703.4	159.3	178.4	183.3	174.9
	MISCELLANEOUS	178.3	52.7	44.5	36.7	43.5
	TOTAL	1964.2	497.7	486.2	489.6	475.9
REGION 4						
	UTILITY	1432.8	339.0	331.3	404.3	340.3
	IND FUEL COMB	372.9	91.7	93.0	94.1	94.6
	COM/INST/RES	132.0	47.6	31.2	23.6	29.9
	IND PROC	101.1	23.7	26.6	26.1	25.2
	TRANSPORTATION	1314.5	303.6	337.1	336.3	326.3
	MISCELLANEOUS	294.3	80.0	72.7	68.2	72.1
	TOTAL	3647.5	885.6	891.9	952.6	888.4
REGION 5						
	UTILITY	1586.8	402.0	372.1	401.6	386.9
	IND FUEL COMB	351.7	86.2	88.7	88.3	88.9
	COM/INST/RES	129.4	57.1	32.9	11.0	28.6
	IND PROC	90.6	19.5	23.8	23.9	23.1
	TRANSPORTATION	1422.3	317.2	357.1	371.4	359.6
	MISCELLANEOUS	352.0	106.3	88.6	70.6	84.7
	TOTAL	3932.8	988.4	963.2	966.9	971.7

TABLE C.23 (Cont'd)

		ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
REGION 6						
	UTILITY	1058.2	242.8	235.8	317.0	249.5
	IND FUEL COMB	1285.6	323.6	316.4	327.1	324.4
	COM/INST/RES	77.3	40.0	15.7	4.9	15.2
	IND PROC	168.6	39.9	43.1	43.3	42.3
	TRANSPORTATION	1002.4	230.8	257.2	258.2	247.1
	MISCELLANEOUS	330.5	88.2	81.4	78.0	81.3
	TOTAL	3922.6	965.3	949.7	1028.6	959.8
REGION 7						
	UTILITY	445.2	126.9	101.5	117.3	103.4
	IND FUEL COMB	184.3	46.6	45.1	46.9	46.6
	COM/INST/RES	33.2	16.0	7.7	2.4	7.1
	IND PROC	40.4	9.1	10.4	10.7	10.3
	TRANSPORTATION	477.2	105.7	123.1	123.2	119.7
	MISCELLANEOUS	129.2	38.4	31.8	27.2	31.2
	TOTAL	1309.6	342.7	319.6	327.7	318.3
REGION 8						
	UTILITY	431.3	116.1	99.2	109.3	107.0
	IND FUEL COMB	109.5	27.1	27.1	27.8	27.7
	COM/INST/RES	27.4	10.9	7.3	2.8	6.4
	IND PROC	14.5	2.9	3.7	4.0	3.8
	TRANSPORTATION	273.1	58.6	65.1	76.3	71.3
	MISCELLANEOUS	168.6	43.3	42.4	40.3	42.0
	TOTAL	1024.4	258.7	244.7	260.5	258.2
REGION 9						
	UTILITY	229.5	53.3	53.0	65.9	54.9
	IND FUEL COMB	119.3	29.3	29.6	30.3	30.2
	COM/INST/RES	42.1	16.9	10.8	5.3	9.0
	IND PROC	75.1	16.6	19.2	19.9	19.2
	TRANSPORTATION	845.9	199.8	211.5	217.3	211.9
	MISCELLANEOUS	188.8	50.7	47.4	43.7	46.2
	TOTAL	1500.8	366.6	371.6	382.5	371.5
REGION 10						
	UTILITY	37.5	10.3	5.2	10.8	10.9
	IND FUEL COMB	86.9	21.7	21.7	21.8	21.9
	COM/INST/RES	14.6	5.8	3.4	1.8	3.4
	IND PROC	21.5	5.2	5.5	5.5	5.4
	TRANSPORTATION	279.0	61.8	63.4	74.8	77.3
	MISCELLANEOUS	122.9	31.0	30.6	30.0	30.6
	TOTAL	562.3	135.8	129.9	144.6	149.4

TABLE C.23 (Cont'd)

	ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
REGION TOTAL					
UTILITY	6338.5	1585.4	1461.7	1715.4	1515.5
IND FUEL COMB	2868.7	712.2	711.7	727.1	725.7
COM/INST/RES	642.8	270.0	155.9	71.6	141.8
IND PROC	592.1	134.0	153.2	154.8	149.9
TRANSPORTATION	7172.7	1626.5	1792.9	1874.9	1809.1
MISCELLANEOUS	1928.9	546.5	480.9	422.1	470.0
TOTAL	19543.7	4874.6	4756.4	4966.0	4812.0

TABLE C.24 1986 Sectoral NO_x Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
REGION 1						
	UTILITY	122.0	35.7	31.7	29.4	26.0
	IND FUEL COMB	26.1	6.4	6.5	6.6	6.6
	COM/INST/RES	25.5	11.4	6.6	2.0	5.5
	IND PROC	2.1	0.5	0.5	0.6	0.5
	TRANSPORTATION	339.9	80.6	83.6	88.5	86.2
	MISCELLANEOUS	58.4	20.0	14.8	9.8	13.7
	TOTAL	573.9	154.5	143.8	136.9	138.5
REGION 2						
	UTILITY	180.7	48.2	44.3	51.0	39.8
	IND FUEL COMB	163.7	40.0	40.8	41.6	41.6
	COM/INST/RES	95.3	41.6	24.3	8.4	21.0
	IND PROC	16.2	3.5	4.2	4.3	4.2
	TRANSPORTATION	540.7	140.1	142.3	137.9	117.9
	MISCELLANEOUS	109.2	37.7	27.5	18.0	25.7
	TOTAL	1105.8	311.1	283.3	261.2	250.3
REGION 3						
	UTILITY	780.4	211.0	181.8	206.2	184.0
	IND FUEL COMB	163.3	40.4	41.3	40.9	41.0
	COM/INST/RES	65.5	24.7	16.0	9.3	15.6
	IND PROC	64.2	14.5	16.7	16.7	16.1
	TRANSPORTATION	724.6	162.4	218.1	177.8	169.7
	MISCELLANEOUS	181.9	54.4	45.4	37.4	44.3
	TOTAL	1979.8	507.4	519.2	488.3	470.7
REGION 4						
	UTILITY	1463.6	362.7	336.0	426.1	355.8
	IND FUEL COMB	355.0	88.8	88.4	89.6	89.8
	COM/INST/RES	130.0	46.9	30.7	23.2	29.4
	IND PROC	99.5	23.4	26.2	24.9	24.8
	TRANSPORTATION	1354.1	320.6	349.7	346.9	332.1
	MISCELLANEOUS	300.2	82.5	74.1	69.6	73.5
	TOTAL	3702.5	924.9	905.2	980.3	905.4
REGION 5						
	UTILITY	1598.5	434.2	377.0	436.5	370.9
	IND FUEL COMB	340.9	85.6	86.1	85.0	85.4
	COM/INST/RES	127.8	56.4	32.5	10.9	28.2
	IND PROC	91.4	21.1	24.1	23.5	22.6
	TRANSPORTATION	1465.2	337.5	363.7	389.6	370.3
	MISCELLANEOUS	359.2	109.6	90.4	72.1	86.4
	TOTAL	3983.0	1044.4	973.8	1017.5	963.8

TABLE C.24 (Cont'd)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
REGION 6						
	UTILITY	1036.3	250.3	216.7	314.1	258.1
	IND FUEL COMB	1165.0	301.4	286.0	294.8	292.2
	COM/INST/RES	77.0	41.4	15.6	4.9	15.2
	IND PROC	172.5	41.5	44.1	43.3	43.1
	TRANSPORTATION	1032.7	254.8	261.1	257.9	256.1
	MISCELLANEOUS	337.2	91.0	83.1	79.6	82.9
	TOTAL	3820.7	980.3	906.7	994.6	947.6
REGION 7						
	UTILITY	436.0	107.7	94.3	127.4	103.4
	IND FUEL COMB	170.1	43.9	41.6	43.0	42.7
	COM/INST/RES	32.7	15.8	7.6	2.4	7.0
	IND PROC	41.2	9.4	10.5	10.6	10.5
	TRANSPORTATION	491.6	111.0	125.5	128.3	123.6
	MISCELLANEOUS	131.9	39.6	32.4	27.8	31.8
	TOTAL	1303.5	327.4	311.9	339.5	319.0
REGION 8						
	UTILITY	421.9	117.1	84.6	105.6	113.1
	IND FUEL COMB	104.6	26.5	25.9	26.3	26.3
	COM/INST/RES	27.1	10.8	7.2	2.8	6.3
	IND PROC	15.3	3.2	3.9	4.2	4.0
	TRANSPORTATION	281.4	60.0	68.5	79.7	72.1
	MISCELLANEOUS	172.0	44.6	43.2	41.1	42.8
	TOTAL	1022.2	262.1	233.2	259.7	264.7
REGION 9						
	UTILITY	193.3	54.1	42.9	53.9	44.6
	IND FUEL COMB	112.2	28.5	27.9	28.2	28.2
	COM/INST/RES	41.6	16.8	10.6	5.3	8.9
	IND PROC	77.9	17.9	19.9	20.2	19.7
	TRANSPORTATION	871.4	204.0	214.0	226.2	222.3
	MISCELLANEOUS	192.7	52.2	48.4	44.6	47.1
	TOTAL	1489.0	373.6	363.8	378.5	370.8
REGION 10						
	UTILITY	22.7	9.7	0.0	4.7	8.8
	IND FUEL COMB	80.3	20.5	20.0	20.1	20.2
	COM/INST/RES	14.5	6.0	3.4	1.7	3.4
	IND PROC	21.9	5.2	5.6	5.5	5.5
	TRANSPORTATION	287.4	60.6	68.3	80.6	77.1
	MISCELLANEOUS	125.4	32.0	31.3	30.6	31.2
	TOTAL	552.2	134.0	128.6	143.4	146.2

TABLE C.24 (Cont'd)

	ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
REGION TOTAL					
UTILITY	6255.3	1630.6	1409.4	1754.8	1504.5
IND FUEL COMB	2681.2	682.0	664.5	676.2	674.1
COM/INST/RES	636.9	271.9	154.5	70.9	140.5
IND PROC	602.1	140.1	155.7	153.8	151.0
TRANSPORTATION	7389.1	1731.7	1894.8	1913.5	1827.4
MISCELLANEOUS	1968.2	563.5	490.7	430.7	479.6
TOTAL	19532.8	5019.6	4769.6	4999.9	4777.0

C.3 VOC EMISSIONS

TABLE C.25 1985 Sectoral VOC Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
REGION 1						
	UTILITY	1.2	0.4	0.3	0.3	0.3
	IND FUEL COMB	6.2	1.6	1.5	1.5	1.6
	COM/INST/RES	228.6	103.8	59.0	16.8	49.1
	IND PROC	352.4	85.8	88.1	89.2	89.5
	TRANSPORTATION	389.5	104.8	96.3	92.7	97.5
	MISCELLANEOUS	116.1	28.5	29.1	29.2	29.2
	TOTAL	1094.1	324.9	274.3	229.7	267.2
REGION 2						
	UTILITY	1.7	0.5	0.4	0.5	0.4
	IND FUEL COMB	8.4	2.6	2.1	1.7	2.0
	COM/INST/RES	286.0	130.0	73.0	20.7	62.3
	IND PROC	569.5	138.6	142.2	144.5	144.4
	TRANSPORTATION	655.4	175.6	160.1	159.5	163.2
	MISCELLANEOUS	237.1	58.2	59.4	59.7	59.7
	TOTAL	1758.1	505.5	437.2	386.5	432.0
REGION 3						
	UTILITY	4.3	1.2	1.0	1.1	1.0
	IND FUEL COMB	7.0	1.8	1.8	1.7	1.7
	COM/INST/RES	390.6	179.8	96.9	26.7	87.3
	IND PROC	785.6	191.2	195.8	199.4	199.4
	TRANSPORTATION	774.0	195.8	195.1	193.0	193.6
	MISCELLANEOUS	240.9	58.6	60.4	60.9	61.0
	TOTAL	2202.4	628.4	551.0	482.7	543.9
REGION 4						
	UTILITY	7.1	1.8	1.6	2.1	1.7
	IND FUEL COMB	45.1	11.5	11.3	11.3	11.3
	COM/INST/RES	409.2	210.6	90.8	26.0	81.8
	IND PROC	1881.7	459.9	470.4	475.1	476.7
	TRANSPORTATION	1369.0	339.6	350.9	346.1	338.3
	MISCELLANEOUS	517.4	105.8	132.5	139.2	139.9
	TOTAL	4229.6	1129.2	1057.4	999.7	1049.7
REGION 5						
	UTILITY	7.5	2.0	1.8	1.9	1.9
	IND FUEL COMB	8.6	2.3	2.1	2.1	2.1
	COM/INST/RES	596.8	270.7	153.3	43.4	129.5
	IND PROC	1571.8	382.6	392.6	398.0	398.9
	TRANSPORTATION	1427.6	382.1	364.4	335.9	351.8
	MISCELLANEOUS	466.0	112.9	117.0	118.0	118.1
	TOTAL	4078.3	1152.5	1031.1	899.3	1002.3

TABLE C.25 (Cont'd)

		ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
REGION 6						
	UTILITY	7.5	1.8	1.7	2.2	1.8
	IND FUEL COMB	27.3	7.3	6.7	6.6	6.7
	COM/INST/RES	116.8	62.3	24.0	7.3	23.2
	IND PROC	1875.1	454.7	464.8	478.6	477.4
	TRANSPORTATION	1037.6	259.2	262.5	265.6	254.7
	MISCELLANEOUS	430.1	79.0	111.3	119.5	120.3
	TOTAL	3494.4	864.3	870.9	880.0	884.1
REGION 7						
	UTILITY	2.5	0.7	0.6	0.6	0.6
	IND FUEL COMB	2.0	0.6	0.5	0.5	0.5
	COM/INST/RES	116.4	58.8	26.2	7.4	24.0
	IND PROC	493.1	119.7	122.8	125.1	125.5
	TRANSPORTATION	391.4	102.6	99.2	94.7	96.8
	MISCELLANEOUS	130.9	29.3	33.2	34.2	34.3
	TOTAL	1136.3	311.7	282.4	262.5	281.7
REGION 8						
	UTILITY	2.9	0.8	0.7	0.7	0.7
	IND FUEL COMB	2.5	0.6	0.6	0.6	0.6
	COM/INST/RES	61.9	25.6	16.5	5.2	14.6
	IND PROC	150.1	36.7	37.5	38.3	37.6
	TRANSPORTATION	288.7	77.4	70.8	69.9	71.8
	MISCELLANEOUS	184.3	24.3	49.0	55.2	55.9
	TOTAL	690.4	165.4	175.1	170.0	181.3
REGION 9						
	UTILITY	1.9	0.5	0.4	0.6	0.5
	IND FUEL COMB	13.6	3.5	3.4	3.4	3.4
	COM/INST/RES	129.8	52.8	33.2	16.1	27.7
	IND PROC	718.0	175.2	179.0	182.9	181.1
	TRANSPORTATION	536.5	127.3	136.3	140.8	134.0
	MISCELLANEOUS	357.8	73.5	91.6	96.1	96.6
	TOTAL	1757.6	432.8	443.9	439.9	443.2
REGION 10						
	UTILITY	0.2	0.1	0.0	0.1	0.1
	IND FUEL COMB	13.3	3.4	3.3	3.3	3.3
	COM/INST/RES	106.8	44.9	25.0	12.1	24.7
	IND PROC	172.6	41.9	43.1	43.9	43.8
	TRANSPORTATION	308.1	79.2	76.4	76.0	77.8
	MISCELLANEOUS	219.4	28.0	58.4	66.1	66.9
	TOTAL	820.5	197.5	206.3	201.5	216.6

TABLE C.25 (Cont'd)

	ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
REGION TOTAL					
UTILITY	36.9	9.7	8.4	10.0	8.8
IND FUEL COMB	134.0	35.2	33.3	32.7	33.3
COM/INST/RES	2442.9	1139.2	597.9	181.7	524.1
IND PROC	8570.0	2086.1	2136.2	2175.0	2174.2
TRANSPORTATION	7177.9	1843.7	1812.0	1774.2	1779.5
MISCELLANEOUS	2900.0	598.0	741.8	778.2	782.0
TOTAL	21261.8	5712.0	5329.7	4951.8	5302.0

TABLE C.26 1986 Sectoral VOC Emissions by Federal Region and Season (10^3 t)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
REGION 1						
	UTILITY	1.4	0.4	0.3	0.3	0.3
	IND FUEL COMB	5.8	1.5	1.4	1.4	1.5
	COM/INST/RES	228.6	103.8	59.0	16.8	49.1
	IND PROC	347.7	84.8	86.5	88.1	88.5
	TRANSPORTATION	370.2	99.8	91.5	88.1	92.7
	MISCELLANEOUS	116.1	28.5	29.1	29.2	29.2
	TOTAL	1069.7	318.8	267.8	224.0	261.2
REGION 2						
	UTILITY	1.8	0.5	0.4	0.5	0.4
	IND FUEL COMB	7.5	2.4	1.9	1.5	1.8
	COM/INST/RES	285.9	130.0	73.0	20.7	62.3
	IND PROC	565.6	137.5	140.5	144.0	143.8
	TRANSPORTATION	622.7	167.1	152.2	151.5	155.1
	MISCELLANEOUS	237.1	58.2	59.4	59.7	59.7
	TOTAL	1720.6	495.7	427.4	377.9	423.1
REGION 3						
	UTILITY	4.4	1.2	1.0	1.2	1.0
	IND FUEL COMB	6.5	1.7	1.6	1.6	1.6
	COM/INST/RES	390.5	179.7	96.9	26.6	87.3
	IND PROC	782.6	190.2	194.1	199.3	199.3
	TRANSPORTATION	737.2	186.5	185.8	184.1	184.4
	MISCELLANEOUS	240.9	58.6	60.4	60.9	61.0
	TOTAL	2162.1	617.9	539.8	473.7	534.6
REGION 4						
	UTILITY	7.5	1.8	1.7	2.3	1.8
	IND FUEL COMB	44.6	11.2	11.1	11.2	11.1
	COM/INST/RES	409.2	210.6	90.8	26.0	81.8
	IND PROC	1870.9	462.5	467.7	472.4	470.7
	TRANSPORTATION	1307.1	323.9	334.9	330.8	323.2
	MISCELLANEOUS	517.4	105.8	132.5	139.2	139.9
	TOTAL	4156.7	1115.9	1038.7	981.8	1028.6
REGION 5						
	UTILITY	7.5	2.0	1.8	2.1	1.7
	IND FUEL COMB	8.0	2.1	2.0	2.0	2.0
	COM/INST/RES	596.7	270.7	153.3	43.4	129.5
	IND PROC	1555.4	379.2	386.6	394.8	395.9
	TRANSPORTATION	1357.2	363.7	346.3	319.6	334.6
	MISCELLANEOUS	466.0	112.9	117.0	118.0	118.1
	TOTAL	3990.8	1130.5	1006.9	879.8	981.8

TABLE C.26 (Cont'd)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
REGION 6						
	UTILITY	7.5	1.8	1.6	2.3	1.8
	IND FUEL COMB	25.2	6.9	6.2	6.1	6.2
	COM/INST/RES	116.8	62.3	24.0	7.3	23.2
	IND PROC	1893.8	455.7	467.2	486.4	483.6
	TRANSPORTATION	993.9	247.6	251.4	254.9	244.2
	MISCELLANEOUS	430.1	79.0	111.3	119.5	120.3
	TOTAL	3467.2	853.2	861.6	876.4	879.4
REGION 7						
	UTILITY	2.4	0.6	0.5	0.7	0.6
	IND FUEL COMB	1.8	0.6	0.4	0.4	0.4
	COM/INST/RES	116.4	58.8	26.2	7.4	24.0
	IND PROC	489.9	118.9	121.4	124.7	125.0
	TRANSPORTATION	373.2	97.8	94.5	90.4	92.3
	MISCELLANEOUS	130.9	29.3	33.2	34.2	34.3
	TOTAL	1114.5	305.9	276.3	257.7	276.6
REGION 8						
	UTILITY	2.8	0.8	0.6	0.7	0.8
	IND FUEL COMB	2.4	0.6	0.6	0.6	0.6
	COM/INST/RES	61.9	25.5	16.5	5.2	14.6
	IND PROC	151.4	36.7	37.6	38.9	38.3
	TRANSPORTATION	275.6	73.9	67.6	66.8	68.6
	MISCELLANEOUS	184.3	24.3	49.0	55.2	55.9
	TOTAL	678.4	161.8	171.8	167.4	178.7
REGION 9						
	UTILITY	1.6	0.4	0.4	0.5	0.4
	IND FUEL COMB	13.2	3.4	3.3	3.3	3.3
	COM/INST/RES	129.8	52.8	33.2	16.1	27.7
	IND PROC	721.0	175.0	178.8	184.5	182.8
	TRANSPORTATION	518.8	122.5	131.7	136.3	129.7
	MISCELLANEOUS	357.8	73.5	91.6	96.1	96.6
	TOTAL	1742.2	427.6	438.8	436.9	440.5
REGION 10						
	UTILITY	0.1	0.1	0.0	0.0	0.1
	IND FUEL COMB	13.3	3.3	3.3	3.3	3.3
	COM/INST/RES	106.8	44.9	25.0	12.1	24.7
	IND PROC	171.9	41.6	42.7	43.9	43.7
	TRANSPORTATION	294.8	75.7	73.1	72.8	74.5
	MISCELLANEOUS	219.4	28.0	58.4	66.1	66.9
	TOTAL	806.4	193.6	202.5	198.3	213.2

TABLE C.26 (Cont'd)

	ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
REGION TOTAL					
UTILITY	37.0	9.5	8.3	10.5	8.9
IND FUEL COMB	128.2	33.8	31.9	31.4	31.8
COM/INST/RES	2442.6	1139.1	597.9	181.6	524.1
IND PROC	8550.3	2082.2	2123.0	2177.0	2171.8
TRANSPORTATION	6850.8	1758.6	1728.8	1695.3	1699.2
MISCELLANEOUS	2900.0	598.0	741.8	778.2	782.0
TOTAL	20908.9	5621.2	5231.6	4874.0	5217.7

APPENDIX D:

SECTORAL SO_2, NO_x, AND VOC EMISSIONS BY SEASON FOR NORTHEASTERN, SOUTHEASTERN, AND WESTERN REGIONS
(in thousand metric tons)

D.1 SO_2 EMISSIONS

TABLE D.1 1976 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN76-DEC76	WINTER DEC75-FEB76	SPRING MAR76-MAY76	SUMMER JUN76-AUG76	FALL SEP76-NOV76
NORTHEAST						
	UTILITY	10273.5	2711.8	2456.5	2615.1	2494.3
	IND FUEL COMB	1405.2	355.7	351.9	347.6	352.6
	COM/INST/RES	512.5	205.9	126.8	54.7	118.7
	IND PROC	989.8	231.7	262.6	251.6	244.9
	MISCELLANEOUS	350.2	102.3	87.8	71.7	84.9
	TOTAL	13531.2	3607.4	3285.6	3340.6	3295.4
SOUTHEAST						
	UTILITY	4933.9	1196.4	1118.4	1368.0	1221.2
	IND FUEL COMB	635.7	157.1	158.4	157.7	160.3
	COM/INST/RES	117.4	54.3	25.8	11.3	24.0
	IND PROC	412.8	97.2	106.1	106.2	104.7
	MISCELLANEOUS	130.7	34.4	32.4	30.6	32.1
	TOTAL	6230.5	1539.5	1441.0	1673.7	1542.3
WEST						
	UTILITY	2233.7	582.3	471.8	584.3	565.0
	IND FUEL COMB	679.7	166.6	169.9	169.0	170.6
	COM/INST/RES	461.8	214.3	100.1	40.6	97.9
	IND PROC	3190.7	810.9	874.8	765.3	751.0
	MISCELLANEOUS	237.5	58.8	59.3	58.2	59.2
	TOTAL	6803.5	1832.9	1675.9	1617.3	1643.7
NATIONAL						
	UTILITY	17441.1	4490.6	4046.7	4567.4	4280.5
	IND FUEL COMB	2720.7	679.4	680.2	674.3	683.5
	COM/INST/RES	1091.7	474.6	252.7	106.6	240.6
	IND PROC	4593.3	1139.7	1243.5	1123.0	1100.6
	MISCELLANEOUS	718.4	195.5	179.5	160.4	176.2
	TOTAL	26565.3	6979.8	6402.5	6631.7	6481.5

TABLE D.2 1977 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN77-DEC77	WINTER DEC76-FEB77	SPRING MAR77-MAY77	SUMMER JUN77-AUG77	FALL SEP77-NOV77
NORTHEAST						
	UTILITY	10189.9	2720.8	2412.8	2667.0	2446.8
	IND FUEL COMB	1414.9	354.7	354.3	350.0	355.1
	COM/INST/RES	503.5	209.5	124.5	54.1	116.8
	IND PROC	1015.6	233.2	268.4	259.9	252.6
	MISCELLANEOUS	367.7	109.4	92.2	75.2	89.2
	TOTAL	13491.6	3627.6	3252.2	3406.3	3260.4
SOUTHEAST						
	UTILITY	4992.6	1324.2	1056.0	1451.1	1195.3
	IND FUEL COMB	657.8	163.0	163.8	163.2	165.9
	COM/INST/RES	115.2	55.6	25.3	11.1	23.6
	IND PROC	426.2	97.4	109.4	110.1	108.4
	MISCELLANEOUS	137.2	36.8	34.0	32.1	33.7
	TOTAL	6329.0	1676.9	1388.5	1767.7	1526.9
WEST						
	UTILITY	2447.2	648.8	558.3	663.0	572.6
	IND FUEL COMB	693.8	172.7	173.4	172.5	174.1
	COM/INST/RES	451.4	219.7	97.9	39.8	95.8
	IND PROC	2981.3	760.3	812.6	720.5	706.7
	MISCELLANEOUS	243.6	61.9	60.9	59.6	60.7
	TOTAL	6817.3	1863.4	1703.0	1655.4	1609.9
NATIONAL						
	UTILITY	17629.6	4693.8	4027.2	4781.1	4214.7
	IND FUEL COMB	2766.4	690.4	691.5	685.6	695.1
	COM/INST/RES	1070.2	484.8	247.7	105.1	236.2
	IND PROC	4423.1	1090.9	1190.4	1090.5	1067.7
	MISCELLANEOUS	748.6	208.0	187.1	167.0	183.6
	TOTAL	26637.9	7167.9	6343.8	6829.3	6397.3

TABLE D.3 1978 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN78-DEC78	WINTER DEC77-FEB78	SPRING MAR78-MAY78	SUMMER JUN78-AUG78	FALL SEP78-NOV78
NORTHEAST						
	UTILITY	9527.2	2405.6	2195.6	2519.1	2408.2
	IND FUEL COMB	1412.8	355.2	353.8	349.5	354.5
	COM/INST/RES	493.8	203.4	121.6	55.7	115.6
	IND PROC	1004.5	231.3	264.3	258.9	251.3
	MISCELLANEOUS	389.6	115.5	97.7	79.7	94.5
	TOTAL	12827.9	3311.0	3032.9	3262.9	3224.1
SOUTHEAST						
	UTILITY	4424.6	1170.1	958.9	1268.9	1073.2
	IND FUEL COMB	639.1	161.7	159.2	158.6	161.2
	COM/INST/RES	111.3	53.1	24.7	11.4	23.2
	IND PROC	435.3	99.3	111.5	112.9	111.0
	MISCELLANEOUS	145.4	38.9	36.0	34.0	35.7
	TOTAL	5755.7	1523.1	1290.3	1585.7	1404.3
WEST						
	UTILITY	2305.7	642.3	477.5	612.6	566.3
	IND FUEL COMB	679.5	171.4	169.8	168.9	170.5
	COM/INST/RES	422.6	207.4	91.5	38.6	90.4
	IND PROC	2638.0	679.4	711.9	644.6	632.1
	MISCELLANEOUS	258.1	64.9	64.5	63.2	64.3
	TOTAL	6303.9	1765.4	1515.3	1527.9	1523.7
NATIONAL						
	UTILITY	16257.5	4218.0	3632.0	4400.5	4047.7
	IND FUEL COMB	2731.5	688.4	682.8	676.9	686.3
	COM/INST/RES	1027.6	463.8	237.8	105.7	229.2
	IND PROC	4077.8	1010.0	1087.7	1016.4	994.4
	MISCELLANEOUS	793.1	219.3	198.2	176.9	194.5
	TOTAL	24887.6	6599.5	5838.5	6376.5	6152.1

TABLE D.4 1979 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN79-DEC79	WINTER DEC78-FEB79	SPRING MAR79-MAY79	SUMMER JUN79-AUG79	FALL SEP79-NOV79
NORTHEAST						
	UTILITY	9675.2	2545.7	2310.6	2483.1	2340.6
	IND FUEL COMB	1407.1	354.1	352.4	348.0	353.1
	COM/INST/RES	406.7	177.3	100.1	45.8	95.2
	IND PROC	1014.6	231.9	267.3	261.1	253.6
	MISCELLANEOUS	420.2	123.9	105.4	86.0	101.9
	TOTAL	12923.9	3432.9	3135.8	3224.1	3144.3
SOUTHEAST						
	UTILITY	4268.4	1114.4	968.1	1213.4	988.2
	IND FUEL COMB	605.5	154.6	150.9	150.2	152.7
	COM/INST/RES	91.6	46.1	20.3	9.3	19.1
	IND PROC	437.6	100.3	112.2	113.4	111.5
	MISCELLANEOUS	156.8	41.7	38.9	36.7	38.6
	TOTAL	5559.9	1457.1	1290.2	1523.1	1310.1
WEST						
	UTILITY	2393.4	700.5	519.1	609.1	584.5
	IND FUEL COMB	642.5	164.0	160.6	159.7	161.2
	COM/INST/RES	348.1	178.7	75.4	31.7	74.5
	IND PROC	2728.8	665.2	737.6	665.5	652.7
	MISCELLANEOUS	285.0	70.7	71.2	69.8	71.0
	TOTAL	6397.8	1779.2	1563.8	1535.8	1544.0
NATIONAL						
	UTILITY	16337.1	4360.6	3797.7	4305.6	3913.3
	IND FUEL COMB	2655.1	672.7	663.8	657.9	667.0
	COM/INST/RES	846.4	402.1	195.9	86.9	188.8
	IND PROC	4180.9	997.4	1117.0	1040.1	1017.8
	MISCELLANEOUS	862.1	236.3	215.4	192.5	211.5
	TOTAL	24881.6	6669.1	5989.8	6283.0	5998.3

TABLE D.5 1980 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN80-DEC80	WINTER DEC79-FEB80	SPRING MAR80-MAY80	SUMMER JUN80-AUG80	FALL SEP80-NOV80
NORTHEAST						
	UTILITY	9134.6	2509.9	2130.1	2355.5	2170.7
	IND FUEL COMB	1234.9	335.4	310.6	286.8	310.2
	COM/INST/RES	406.8	168.4	100.9	42.1	93.7
	IND PROC	919.4	227.5	242.6	217.1	230.8
	MISCELLANEOUS	437.7	130.5	109.8	89.6	106.1
	TOTAL	12133.4	3371.7	2894.0	2991.2	2911.5
SOUTHEAST						
	UTILITY	4327.5	1094.7	964.4	1227.7	1013.9
	IND FUEL COMB	540.5	145.0	134.9	127.5	136.4
	COM/INST/RES	94.2	44.9	20.6	8.8	19.0
	IND PROC	420.4	101.2	107.0	103.9	107.2
	MISCELLANEOUS	163.4	43.9	40.5	38.2	40.2
	TOTAL	5546.0	1429.7	1267.4	1506.1	1316.8
WEST						
	UTILITY	2478.3	662.2	548.6	686.5	592.7
	IND FUEL COMB	576.0	154.4	144.6	137.0	143.8
	COM/INST/RES	377.0	177.5	81.8	32.5	79.6
	IND PROC	2192.1	627.2	653.5	483.2	455.8
	MISCELLANEOUS	290.0	73.9	72.5	71.0	72.3
	TOTAL	5913.5	1695.1	1501.0	1410.2	1344.2
NATIONAL						
	UTILITY	15940.4	4266.7	3643.1	4269.6	3777.4
	IND FUEL COMB	2351.5	634.8	590.2	551.3	590.4
	COM/INST/RES	878.0	390.8	203.3	83.5	192.3
	IND PROC	3531.8	955.9	1003.1	804.3	793.8
	MISCELLANEOUS	891.2	248.3	222.7	198.8	218.6
	TOTAL	23592.9	6496.5	5662.3	5907.5	5572.5

TABLE D.6 1981 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN81-DEC81	WINTER DEC80-FEB81	SPRING MAR81-MAY81	SUMMER JUN81-AUG81	FALL SEP81-NOV81
NORTHEAST						
	UTILITY	8722.8	2408.7	2067.2	2238.5	2057.6
	IND FUEL COMB	1270.6	326.1	325.0	320.8	310.3
	COM/INST/RES	359.5	154.1	88.5	40.8	84.2
	IND PROC	886.1	213.2	237.7	234.1	215.6
	MISCELLANEOUS	437.7	132.3	109.8	89.6	106.1
	TOTAL	11676.8	3234.5	2828.2	2923.7	2774.0
SOUTHEAST						
	UTILITY	4451.4	1144.4	1008.6	1298.0	1018.1
	IND FUEL COMB	522.0	135.8	133.0	131.7	128.3
	COM/INST/RES	80.9	40.5	18.0	8.3	16.9
	IND PROC	399.8	96.6	105.3	104.8	98.6
	MISCELLANEOUS	163.4	44.5	40.5	38.2	40.2
	TOTAL	5617.5	1461.8	1305.3	1581.0	1302.1
WEST						
	UTILITY	2423.6	614.6	528.3	664.3	599.7
	IND FUEL COMB	546.7	142.7	138.8	137.4	134.4
	COM/INST/RES	306.0	158.7	66.3	28.0	65.5
	IND PROC	2383.2	578.5	629.5	597.4	581.6
	MISCELLANEOUS	290.0	74.3	72.5	71.0	72.3
	TOTAL	5949.5	1568.9	1435.4	1498.2	1453.4
NATIONAL						
	UTILITY	15597.8	4167.8	3604.1	4200.8	3675.4
	IND FUEL COMB	2339.3	604.6	596.8	589.9	573.0
	COM/INST/RES	746.4	353.3	172.7	77.2	166.7
	IND PROC	3669.1	888.4	972.5	936.2	895.7
	MISCELLANEOUS	891.2	251.1	222.7	198.8	218.6
	TOTAL	23243.7	6265.2	5568.9	6002.8	5529.4

TABLE D.7 1982 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN82-DEC82	WINTER DEC81-FEB82	SPRING MAR82-MAY82	SUMMER JUN82-AUG82	FALL SEP82-NOV82
NORTHEAST						
	UTILITY	8329.7	2358.0	2013.2	2087.1	1933.6
	IND FUEL COMB	1235.6	311.9	310.9	305.0	305.3
	COM/INST/RES	381.3	150.1	93.4	45.6	90.3
	IND PROC	725.4	175.4	190.4	189.6	180.0
	MISCELLANEOUS	402.7	125.2	101.0	82.4	97.6
	TOTAL	11074.7	3120.6	2708.9	2709.6	2606.9
SOUTHEAST						
	UTILITY	3796.9	1015.7	896.7	1076.5	874.8
	IND FUEL COMB	513.0	127.4	128.3	126.8	128.5
	COM/INST/RES	84.3	38.0	18.9	9.2	18.0
	IND PROC	345.4	82.2	88.5	89.8	87.8
	MISCELLANEOUS	150.3	42.1	37.2	35.2	37.0
	TOTAL	4890.0	1305.5	1169.6	1337.5	1146.1
WEST						
	UTILITY	2460.1	643.5	531.3	669.8	623.0
	IND FUEL COMB	532.2	133.4	133.2	132.3	132.7
	COM/INST/RES	306.9	145.2	66.4	29.3	66.4
	IND PROC	2062.8	528.2	528.9	512.2	519.2
	MISCELLANEOUS	266.8	70.3	66.7	65.3	66.5
	TOTAL	5628.9	1520.6	1326.5	1408.9	1407.8
NATIONAL						
	UTILITY	14586.7	4017.2	3441.1	3833.4	3431.4
	IND FUEL COMB	2280.9	572.7	572.4	564.1	566.5
	COM/INST/RES	772.5	333.2	178.7	84.0	174.7
	IND PROC	3133.6	785.8	807.8	791.7	787.1
	MISCELLANEOUS	819.9	237.7	204.9	182.9	201.1
	TOTAL	21593.6	5946.7	5205.0	5456.0	5160.8

TABLE D.8 1983 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN83-DEC83	WINTER DEC82-FEB83	SPRING MAR83-MAY83	SUMMER JUN83-AUG83	FALL SEP83-NOV83
NORTHEAST						
	UTILITY	8497.1	2105.2	1892.9	2279.9	2100.2
	IND FUEL COMB	1156.2	278.3	280.1	292.1	304.5
	COM/INST/RES	326.4	134.9	79.3	42.1	78.6
	IND PROC	720.6	153.1	178.7	193.8	193.4
	MISCELLANEOUS	380.8	117.3	95.5	77.9	92.3
	TOTAL	11081.1	2788.9	2526.5	2885.9	2769.1
SOUTHEAST						
	UTILITY	3719.2	873.5	768.9	1100.2	927.1
	IND FUEL COMB	444.0	111.6	107.4	112.2	116.5
	COM/INST/RES	70.2	33.1	16.0	8.4	15.5
	IND PROC	358.5	77.6	88.4	94.5	96.1
	MISCELLANEOUS	142.1	39.5	35.2	33.3	34.9
	TOTAL	4734.1	1135.2	1015.9	1348.5	1190.1
WEST						
	UTILITY	2455.6	591.5	526.1	691.4	627.9
	IND FUEL COMB	456.1	115.5	111.2	115.4	118.5
	COM/INST/RES	239.0	122.1	51.7	24.4	52.7
	IND PROC	1991.4	473.1	518.0	504.5	506.5
	MISCELLANEOUS	252.3	65.9	63.0	61.8	62.9
	TOTAL	5394.5	1368.0	1270.0	1397.5	1368.4
NATIONAL						
	UTILITY	14672.0	3570.2	3187.9	4071.5	3655.2
	IND FUEL COMB	2056.3	505.5	498.7	519.8	539.4
	COM/INST/RES	635.6	290.1	147.0	74.9	146.8
	IND PROC	3070.4	703.8	785.1	792.8	796.0
	MISCELLANEOUS	775.3	222.6	193.7	173.0	190.2
	TOTAL	21209.6	5292.2	4812.5	5631.9	5327.6

TABLE D.9 1984 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN84-DEC84	WINTER DEC83-FEB84	SPRING MAR84-MAY84	SUMMER JUN84-AUG84	FALL SEP84-NOV84
NORTHEAST						
	UTILITY	8645.9	2378.5	2070.4	2284.2	2029.3
	IND FUEL COMB	1240.7	305.9	311.7	312.9	309.2
	COM/INST/RES	338.9	129.0	82.2	44.5	82.0
	IND PROC	785.0	171.2	207.6	209.9	194.7
	MISCELLANEOUS	398.3	118.6	99.9	81.5	96.6
	TOTAL	11408.8	3103.1	2771.8	2932.9	2711.8
SOUTHEAST						
	UTILITY	3641.2	935.6	824.0	1028.1	900.2
	IND FUEL COMB	478.9	117.5	119.5	120.9	119.8
	COM/INST/RES	72.4	30.7	16.6	8.8	16.1
	IND PROC	384.8	86.3	98.9	101.8	97.3
	MISCELLANEOUS	148.7	39.9	36.8	34.8	36.6
	TOTAL	4725.9	1210.0	1095.8	1294.4	1169.9
WEST						
	UTILITY	2620.7	675.3	575.3	735.5	641.0
	IND FUEL COMB	497.1	121.1	124.6	125.3	124.2
	COM/INST/RES	242.6	110.9	52.4	25.2	53.7
	IND PROC	1930.7	455.3	500.7	498.3	478.9
	MISCELLANEOUS	270.2	67.7	67.5	66.1	67.3
	TOTAL	5561.3	1430.3	1320.4	1450.4	1365.1
NATIONAL						
	UTILITY	14907.8	3989.4	3469.7	4047.7	3570.5
	IND FUEL COMB	2216.7	544.5	555.8	559.2	553.2
	COM/INST/RES	653.8	270.6	151.2	78.5	151.7
	IND PROC	3100.5	712.8	807.1	810.0	770.9
	MISCELLANEOUS	817.2	226.2	204.2	182.4	200.5
	TOTAL	21696.0	5743.4	5187.9	5677.7	5246.8

TABLE D.10 1985 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
NORTHEAST						
	UTILITY	8235.8	2196.4	1958.3	2099.5	1924.9
	IND FUEL COMB	1244.6	302.6	313.7	313.3	316.8
	COM/INST/RES	314.5	125.0	76.6	39.9	75.5
	IND PROC	771.1	163.8	201.4	205.7	197.9
	MISCELLANEOUS	402.6	121.2	100.9	82.4	97.6
	TOTAL	10968.6	2909.1	2650.9	2740.8	2612.7
SOUTHEAST						
	UTILITY	3854.8	912.5	888.9	1078.8	922.3
	IND FUEL COMB	471.3	116.1	118.0	118.6	120.3
	COM/INST/RES	68.1	30.3	15.5	7.9	14.9
	IND PROC	378.7	84.3	97.2	99.9	97.0
	MISCELLANEOUS	150.3	40.8	37.2	35.2	37.0
	TOTAL	4923.1	1183.9	1156.8	1340.4	1191.5
WEST						
	UTILITY	2448.0	684.1	562.5	650.6	568.0
	IND FUEL COMB	487.5	118.5	120.7	124.4	125.2
	COM/INST/RES	235.8	110.1	51.0	23.7	51.7
	IND PROC	1815.6	433.3	476.9	460.5	452.4
	MISCELLANEOUS	273.2	69.7	68.3	66.9	68.1
	TOTAL	5260.2	1415.7	1279.2	1326.1	1265.4
NATIONAL						
	UTILITY	14538.6	3793.0	3409.6	3829.0	3415.2
	IND FUEL COMB	2203.5	537.2	552.4	556.2	562.3
	COM/INST/RES	618.4	265.4	143.0	71.5	142.1
	IND PROC	2965.3	681.4	775.4	766.0	747.3
	MISCELLANEOUS	826.1	231.7	206.4	184.4	202.7
	TOTAL	21151.9	5508.7	5086.9	5407.2	5069.5

TABLE D.11 1986 Sectoral SO_2 Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
NORTHEAST						
	UTILITY	8016.2	2146.2	1881.1	2132.0	1871.4
	IND FUEL COMB	1284.8	302.7	323.4	322.7	324.5
	COM/INST/RES	319.1	120.0	77.7	40.4	76.6
	IND PROC	789.8	172.6	205.4	206.0	198.9
	MISCELLANEOUS	411.4	119.6	103.1	84.2	99.8
	TOTAL	10821.4	861.2	2590.7	2785.3	2571.1
SOUTHEAST						
	UTILITY	3873.4	943.7	896.6	1116.0	936.8
	IND FUEL COMB	495.2	115.2	123.3	125.3	126.0
	COM/INST/RES	69.1	29.1	15.7	8.0	15.1
	IND PROC	387.9	85.5	99.2	100.5	98.6
	MISCELLANEOUS	153.6	40.3	38.1	35.9	37.8
	TOTAL	4979.1	1213.6	1172.8	1385.8	1214.3
WEST						
	UTILITY	2391.4	601.1	497.2	668.9	588.9
	IND FUEL COMB	508.7	118.0	125.9	129.8	129.8
	COM/INST/RES	239.7	107.1	51.8	24.1	52.6
	IND PROC	1916.6	433.5	483.8	488.3	487.6
	MISCELLANEOUS	279.1	68.8	69.7	68.3	69.6
	TOTAL	5335.5	1328.6	1228.5	1379.4	1328.5
NATIONAL						
	UTILITY	14281.1	3691.0	3274.9	3916.8	3397.1
	IND FUEL COMB	2288.7	535.9	572.5	577.9	580.4
	COM/INST/RES	628.0	256.2	145.2	72.5	144.3
	IND PROC	3094.2	691.6	788.4	794.8	785.1
	MISCELLANEOUS	844.0	228.7	210.9	188.5	207.1
	TOTAL	21136.0	5403.5	4992.0	5550.5	5113.9

D.2 NO_x EMISSIONS

TABLE D.12 1976 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN76-DEC76	WINTER DEC75-FEB76	SPRING MAR76-MAY76	SUMMER JUN76-AUG76	FALL SEP76-NOV76
NORTHEAST						
	UTILITY	2569.8	665.7	613.6	654.5	620.0
	IND FUEL COMB	851.7	212.3	213.7	209.0	212.5
	COM/INST/RES	386.3	164.5	97.8	35.1	85.9
	IND PROC	202.4	46.5	53.0	52.0	50.6
	TRANSPORTATION	3112.1	701.8	757.1	843.8	800.4
	MISCELLANEOUS	673.6	208.4	169.3	130.5	161.6
	TOTAL	7795.9	1999.2	1904.5	1924.8	1931.0
SOUTHEAST						
	UTILITY	1199.7	283.9	274.0	330.4	298.6
	IND FUEL COMB	443.0	109.7	110.7	108.9	110.7
	COM/INST/RES	138.1	50.6	32.2	22.9	30.6
	IND PROC	122.2	28.9	32.1	30.2	30.6
	TRANSPORTATION	1357.6	317.4	341.7	356.0	338.3
	MISCELLANEOUS	285.2	77.5	70.4	66.1	69.9
	TOTAL	3545.9	868.1	861.2	914.4	878.7
WEST						
	UTILITY	1358.9	317.1	299.6	382.7	341.8
	IND FUEL COMB	2447.0	627.7	612.3	586.3	603.0
	COM/INST/RES	244.6	113.6	56.1	21.2	51.5
	IND PROC	383.9	91.0	98.3	97.1	96.8
	TRANSPORTATION	2908.0	667.4	718.5	781.8	730.8
	MISCELLANEOUS	911.3	243.7	226.5	212.6	224.1
	TOTAL	8253.7	2060.5	2011.3	2081.7	2048.0
NATIONAL						
	UTILITY	5128.4	1266.7	1187.2	1367.6	1260.4
	IND FUEL COMB	3741.8	949.7	936.7	904.2	926.2
	COM/INST/RES	769.0	328.7	186.1	79.1	168.0
	IND PROC	708.5	166.4	183.4	179.3	178.0
	TRANSPORTATION	7377.7	1686.6	1817.2	1981.6	1869.4
	MISCELLANEOUS	1870.1	529.6	466.2	409.2	455.6
	TOTAL	19595.4	4927.7	4776.9	4920.9	4857.6

TABLE D.13 1977 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN77-DEC77	WINTER DEC76-FEB77	SPRING MAR77-MAY77	SUMMER JUN77-AUG77	FALL SEP77-NOV77
NORTHEAST						
	UTILITY	2608.0	700.8	611.4	682.1	624.2
	IND FUEL COMB	848.2	215.9	212.9	208.1	211.6
	COM/INST/RES	374.5	163.6	94.6	34.7	83.6
	IND PROC	211.5	48.3	55.4	54.3	52.9
	TRANSPORTATION	3186.3	721.9	775.2	863.7	819.5
	MISCELLANEOUS	716.1	221.1	180.0	138.7	171.9
	TOTAL	7944.7	2071.6	1929.4	1981.6	1963.6
SOUTHEAST						
	UTILITY	1240.1	322.9	262.9	364.8	294.2
	IND FUEL COMB	439.0	112.0	109.7	107.9	109.7
	COM/INST/RES	129.0	50.3	30.1	21.1	28.5
	IND PROC	125.0	29.8	32.8	30.9	31.3
	TRANSPORTATION	1391.1	326.8	350.2	364.7	346.7
	MISCELLANEOUS	303.3	82.2	74.9	70.3	74.3
	TOTAL	3627.4	923.9	860.6	959.7	884.7
WEST						
	UTILITY	1537.4	368.4	350.7	440.5	373.1
	IND FUEL COMB	2444.9	645.2	611.7	585.7	602.5
	COM/INST/RES	234.8	112.5	53.8	20.6	49.5
	IND PROC	401.2	94.5	102.7	101.5	101.1
	TRANSPORTATION	2985.2	688.7	737.6	802.3	750.2
	MISCELLANEOUS	968.8	258.5	240.8	226.0	238.3
	TOTAL	8572.3	2167.8	2097.3	2176.7	2114.7
NATIONAL						
	UTILITY	5385.5	1392.1	1225.0	1487.4	1291.6
	IND FUEL COMB	3732.1	973.0	934.3	901.7	923.8
	COM/INST/RES	738.3	326.4	178.5	76.4	161.7
	IND PROC	737.7	172.6	190.9	186.7	185.3
	TRANSPORTATION	7562.7	1737.4	1862.9	2030.7	1916.4
	MISCELLANEOUS	1988.2	561.7	495.7	435.0	484.4
	TOTAL	20144.4	5163.3	4887.3	5118.0	4963.1

TABLE D.14 1978 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN78-DEC78	WINTER DEC77-FEB78	SPRING MAR78-MAY78	SUMMER JUN78-AUG78	FALL SEP78-NOV78
NORTHEAST						
	UTILITY	2544.8	653.0	588.7	664.3	634.2
	IND FUEL COMB	845.2	215.1	212.1	207.4	210.9
	COM/INST/RES	375.2	162.2	94.9	34.3	83.5
	IND PROC	222.2	50.5	58.3	57.1	55.5
	TRANSPORTATION	3199.4	730.1	778.4	866.7	823.0
	MISCELLANEOUS	744.5	231.5	187.1	144.2	178.7
	TOTAL	7931.3	2042.4	1919.6	1974.0	1985.7
SOUTHEAST						
	UTILITY	1239.2	313.9	265.9	356.7	303.3
	IND FUEL COMB	444.7	112.6	111.1	109.3	111.2
	COM/INST/RES	136.1	50.6	31.8	22.8	30.2
	IND PROC	126.5	30.2	33.2	31.3	31.7
	TRANSPORTATION	1399.4	330.8	352.3	366.8	348.8
	MISCELLANEOUS	315.3	86.1	77.8	73.0	77.2
	TOTAL	3661.2	924.1	872.2	959.9	902.3
WEST						
	UTILITY	1583.0	390.8	337.1	450.3	391.2
	IND FUEL COMB	2452.0	646.2	613.5	587.5	604.2
	COM/INST/RES	236.8	111.7	54.3	20.5	49.9
	IND PROC	408.4	96.8	104.5	103.6	103.0
	TRANSPORTATION	3013.9	699.6	744.7	809.6	757.5
	MISCELLANEOUS	1007.2	270.7	250.3	235.0	247.7
	TOTAL	8701.3	2215.7	2104.5	2206.4	2153.6
NATIONAL						
	UTILITY	5367.0	1357.6	1191.7	1471.3	1328.7
	IND FUEL COMB	3741.9	973.9	936.8	904.2	926.2
	COM/INST/RES	748.1	324.5	181.1	77.5	163.6
	IND PROC	757.1	177.5	196.0	192.0	190.3
	TRANSPORTATION	7612.7	1760.5	1875.4	2043.0	1929.2
	MISCELLANEOUS	2067.0	588.2	515.3	452.3	503.6
	TOTAL	20293.8	5182.3	4896.3	5140.3	5041.6

TABLE D.15 1979 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN79-DEC79	WINTER DEC78-FEB79	SPRING MAR79-MAY79	SUMMER JUN79-AUG79	FALL SEP79-NOV79
NORTHEAST						
	UTILITY	2584.7	680.9	617.5	665.3	621.9
	IND FUEL COMB	814.4	209.6	204.4	199.8	203.2
	COM/INST/RES	353.7	156.0	89.5	32.7	78.8
	IND PROC	217.1	50.3	56.8	55.9	54.4
	TRANSPORTATION	3067.2	712.1	746.5	829.7	789.2
	MISCELLANEOUS	758.7	237.5	190.7	147.0	182.1
	TOTAL	7795.9	2046.5	1905.4	1930.4	1929.5
SOUTHEAST						
	UTILITY	1267.3	319.5	287.6	365.5	293.7
	IND FUEL COMB	433.1	111.1	108.3	106.5	108.2
	COM/INST/RES	133.1	50.2	31.2	22.6	29.7
	IND PROC	126.7	30.3	33.2	31.4	31.7
	TRANSPORTATION	1347.3	323.3	339.3	352.8	335.9
	MISCELLANEOUS	321.3	88.3	79.3	74.4	78.7
	TOTAL	3628.8	922.8	879.0	953.2	877.9
WEST						
	UTILITY	1697.8	432.0	373.8	466.4	423.2
	IND FUEL COMB	2364.4	631.4	591.6	566.5	582.6
	COM/INST/RES	222.8	107.5	51.2	19.4	47.0
	IND PROC	404.2	96.6	103.4	102.5	102.0
	TRANSPORTATION	2926.4	689.3	723.2	785.1	735.6
	MISCELLANEOUS	1026.4	277.6	255.1	239.5	252.4
	TOTAL	8642.1	2234.3	2098.3	2179.3	2142.9
NATIONAL						
	UTILITY	5549.9	1432.4	1278.9	1497.2	1338.8
	IND FUEL COMB	3612.0	952.1	904.3	872.8	894.0
	COM/INST/RES	709.7	313.8	172.0	74.7	155.4
	IND PROC	748.0	177.2	193.4	189.8	188.2
	TRANSPORTATION	7340.9	1724.8	1809.0	1967.6	1860.7
	MISCELLANEOUS	2106.3	603.4	525.1	460.9	513.2
	TOTAL	20066.7	5203.6	4882.6	5063.0	4950.3

TABLE D.16 1980 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN80-DEC80	WINTER DEC79-FEB80	SPRING MAR80-MAY80	SUMMER JUN80-AUG80	FALL SEP80-NOV80
NORTHEAST						
	UTILITY	2656.1	711.4	621.7	686.2	625.8
	IND FUEL COMB	690.5	192.1	174.2	158.9	172.3
	COM/INST/RES	340.2	148.2	86.1	32.2	75.9
	IND PROC	191.3	47.6	49.3	46.1	48.7
	TRANSPORTATION	2994.9	741.9	727.2	759.2	764.7
	MISCELLANEOUS	709.1	228.6	178.2	137.4	170.2
	TOTAL	7582.1	2069.7	1836.6	1819.9	1857.6
SOUTHEAST						
	UTILITY	1352.1	331.1	300.1	386.1	319.8
	IND FUEL COMB	375.0	102.8	94.0	88.3	93.5
	COM/INST/RES	137.4	49.8	32.4	24.2	30.9
	IND PROC	120.8	30.1	31.1	29.2	30.1
	TRANSPORTATION	1321.6	331.6	331.2	331.3	330.3
	MISCELLANEOUS	300.3	85.0	74.1	69.6	73.5
	TOTAL	3607.2	930.4	863.0	928.7	878.2
WEST						
	UTILITY	1798.4	441.7	394.5	516.4	443.8
	IND FUEL COMB	1977.7	569.9	497.0	454.6	484.3
	COM/INST/RES	211.3	101.5	48.6	18.4	44.6
	IND PROC	376.3	95.3	95.7	91.8	93.8
	TRANSPORTATION	2896.8	722.3	708.5	729.8	729.5
	MISCELLANEOUS	959.2	267.2	238.4	223.8	235.9
	TOTAL	8219.9	2197.9	1982.7	2034.8	2031.9
NATIONAL						
	UTILITY	5806.7	1484.2	1316.3	1588.7	1389.5
	IND FUEL COMB	3043.3	864.8	765.3	701.8	750.1
	COM/INST/RES	688.8	299.6	167.0	74.9	151.4
	IND PROC	688.4	173.0	176.1	167.1	172.6
	TRANSPORTATION	7213.4	1795.7	1767.0	1820.3	1824.5
	MISCELLANEOUS	1968.6	580.7	490.8	430.7	479.6
	TOTAL	19409.1	5198.0	4682.3	4783.5	4767.7

TABLE D.17 1981 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN81-DEC81	WINTER DEC80-FEB81	SPRING MAR81-MAY81	SUMMER JUN81-AUG81	FALL SEP81-NOV81
NORTHEAST						
	UTILITY	2578.3	699.4	616.5	670.4	608.6
	IND FUEL COMB	696.9	181.7	178.2	174.8	169.5
	COM/INST/RES	313.4	137.8	79.3	30.3	70.1
	IND PROC	187.6	45.2	50.1	49.3	45.6
	TRANSPORTATION	3028.1	763.5	705.1	781.9	786.4
	MISCELLANEOUS	694.9	220.4	174.6	134.6	166.8
	TOTAL	7499.3	2048.0	1803.8	1841.4	1846.9
SOUTHEAST						
	UTILITY	1379.2	355.8	309.0	400.3	318.8
	IND FUEL COMB	370.8	96.5	94.1	92.6	90.9
	COM/INST/RES	133.0	48.3	31.4	23.9	30.1
	IND PROC	115.2	29.1	30.6	28.7	28.3
	TRANSPORTATION	1341.7	333.3	329.3	347.3	331.1
	MISCELLANEOUS	294.3	81.9	72.7	68.2	72.1
	TOTAL	3634.1	945.0	867.1	961.0	871.3
WEST						
	UTILITY	1901.4	442.3	431.1	543.8	468.8
	IND FUEL COMB	1904.3	515.7	480.6	464.1	462.3
	COM/INST/RES	193.0	93.8	44.5	17.0	40.8
	IND PROC	346.5	87.7	89.7	88.2	85.8
	TRANSPORTATION	2963.9	728.9	714.7	768.9	748.4
	MISCELLANEOUS	940.0	257.6	233.6	219.3	231.2
	TOTAL	8249.1	2126.0	1994.2	2101.2	2037.2
NATIONAL						
	UTILITY	5858.9	1497.6	1356.6	1614.4	1396.2
	IND FUEL COMB	2972.0	793.9	753.0	731.5	722.7
	COM/INST/RES	639.4	279.9	155.2	71.2	141.0
	IND PROC	649.3	161.9	170.3	166.2	159.7
	TRANSPORTATION	7333.7	1825.7	1749.1	1898.2	1865.8
	MISCELLANEOUS	1929.2	559.9	481.0	422.1	470.0
	TOTAL	19382.5	5119.0	4665.1	4903.6	4755.4

TABLE D.18 1982 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN82-DEC82	WINTER DEC81-FEB82	SPRING MAR82-MAY82	SUMMER JUN82-AUG82	FALL SEP82-NOV82
NORTHEAST						
	UTILITY	2474.8	688.2	600.6	625.8	573.4
	IND FUEL COMB	709.7	179.6	178.8	174.0	173.9
	COM/INST/RES	312.5	133.5	79.0	30.3	69.9
	IND PROC	153.7	37.3	40.7	40.1	37.8
	TRANSPORTATION	2909.6	651.7	730.9	782.0	747.4
	MISCELLANEOUS	659.4	211.4	165.7	127.7	158.3
	TOTAL	7219.8	1901.6	1795.8	1779.9	1760.7
SOUTHEAST						
	UTILITY	1253.6	329.1	292.2	357.2	291.9
	IND FUEL COMB	374.4	94.4	93.8	92.0	92.9
	COM/INST/RES	133.1	47.5	31.5	23.9	30.2
	IND PROC	94.1	23.9	25.5	23.5	23.0
	TRANSPORTATION	1287.7	299.5	327.7	336.5	324.9
	MISCELLANEOUS	279.2	78.6	69.0	64.7	68.4
	TOTAL	3422.2	873.0	839.6	897.9	831.2
WEST						
	UTILITY	1909.9	481.5	416.8	536.2	477.6
	IND FUEL COMB	1970.3	517.2	493.1	472.1	481.2
	COM/INST/RES	192.8	90.7	44.5	17.0	40.7
	IND PROC	300.9	74.5	77.8	77.1	75.2
	TRANSPORTATION	2838.5	662.9	710.5	764.6	717.8
	MISCELLANEOUS	892.1	247.1	221.7	208.1	219.4
	TOTAL	8104.5	2073.9	1964.4	2075.1	2012.0
NATIONAL						
	UTILITY	5638.3	1498.8	1309.6	1519.2	1343.0
	IND FUEL COMB	3054.4	791.1	765.7	738.1	748.0
	COM/INST/RES	638.4	271.7	154.9	71.2	140.8
	IND PROC	548.8	135.7	144.0	140.7	136.0
	TRANSPORTATION	7035.9	1614.1	1769.1	1883.1	1790.1
	MISCELLANEOUS	1830.8	537.2	456.4	400.6	446.1
	TOTAL	18746.5	4848.5	4599.8	4752.8	4603.9

TABLE D.19 1983 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN83-DEC83	WINTER DEC82-FEB83	SPRING MAR83-MAY83	SUMMER JUN83-AUG83	FALL SEP83-NOV83
NORTHEAST						
	UTILITY	2568.9	622.7	571.4	698.2	636.7
	IND FUEL COMB	643.2	157.6	156.1	161.2	168.6
	COM/INST/RES	289.3	125.9	73.1	29.1	64.9
	IND PROC	158.7	33.7	39.9	42.2	42.0
	TRANSPORTATION	2838.0	611.5	702.3	805.4	730.4
	MISCELLANEOUS	616.9	198.8	155.0	119.5	148.0
	TOTAL	7114.8	1750.2	1697.9	1855.5	1790.6
SOUTHEAST						
	UTILITY	1275.6	298.3	271.0	377.6	313.1
	IND FUEL COMB	341.4	85.5	83.3	85.3	88.3
	COM/INST/RES	135.9	47.2	32.3	25.5	31.1
	IND PROC	87.9	20.2	22.5	21.9	23.3
	TRANSPORTATION	1252.0	290.8	319.6	334.0	310.9
	MISCELLANEOUS	261.2	73.9	64.5	60.5	64.0
	TOTAL	3353.9	815.9	793.3	904.9	830.8
WEST						
	UTILITY	1978.5	458.6	422.1	569.5	505.2
	IND FUEL COMB	1726.8	453.2	423.1	418.4	439.4
	COM/INST/RES	174.8	84.8	40.4	15.5	37.0
	IND PROC	301.1	67.8	75.2	78.1	79.7
	TRANSPORTATION	2742.4	616.3	685.3	763.6	689.7
	MISCELLANEOUS	834.5	232.3	207.4	194.7	205.3
	TOTAL	7758.2	1913.1	1853.4	2039.8	1956.2
NATIONAL						
	UTILITY	5823.0	1379.6	1264.5	1645.3	1455.0
	IND FUEL COMB	2711.4	696.3	662.5	664.8	696.3
	COM/INST/RES	599.9	257.9	145.8	70.0	133.0
	IND PROC	547.7	121.7	137.6	142.3	145.1
	TRANSPORTATION	6832.4	1518.6	1707.3	1903.0	1731.0
	MISCELLANEOUS	1712.6	505.0	427.0	374.7	417.3
	TOTAL	18227.0	4479.2	4344.6	4800.2	4577.6

TABLE D.20 1984 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN84-DEC84	WINTER DEC83-FEB84	SPRING MAR84-MAY84	SUMMER JUN84-AUG84	FALL SEP84-NOV84
NORTHEAST						
	UTILITY	2681.2	714.3	633.5	719.8	640.1
	IND FUEL COMB	698.2	173.5	175.9	174.8	173.3
	COM/INST/RES	306.4	126.7	77.3	31.2	69.0
	IND PROC	172.8	37.9	45.6	46.0	42.8
	TRANSPORTATION	2813.9	603.8	686.1	800.5	726.7
	MISCELLANEOUS	659.4	203.2	165.7	127.7	158.3
	TOTAL	7331.9	1859.3	1784.1	1900.1	1810.1
SOUTHEAST						
	UTILITY	1323.5	324.5	300.3	372.7	330.7
	IND FUEL COMB	374.0	92.6	93.8	93.4	93.0
	COM/INST/RES	139.1	47.8	33.1	25.8	31.8
	IND PROC	102.3	22.7	26.6	26.1	25.8
	TRANSPORTATION	1243.4	283.5	316.7	334.8	310.0
	MISCELLANEOUS	279.2	75.5	69.0	64.7	68.4
	TOTAL	3461.7	846.7	839.5	917.5	859.9
WEST						
	UTILITY	2123.6	530.2	461.5	608.2	527.9
	IND FUEL COMB	1841.7	479.6	464.4	447.2	452.1
	COM/INST/RES	184.1	84.6	42.5	16.5	39.1
	IND PROC	322.9	73.6	82.9	83.6	81.4
	TRANSPORTATION	2732.5	612.4	683.3	760.2	679.0
	MISCELLANEOUS	892.1	237.6	221.7	208.1	219.4
	TOTAL	8096.8	2018.0	1956.3	2123.9	1998.9
NATIONAL						
	UTILITY	6128.3	1569.0	1395.3	1700.7	1498.8
	IND FUEL COMB	2914.0	745.6	734.1	715.4	718.5
	COM/INST/RES	629.6	259.1	152.9	73.6	139.8
	IND PROC	598.0	134.2	155.0	155.8	150.0
	TRANSPORTATION	6789.8	1499.7	1686.2	1895.5	1715.7
	MISCELLANEOUS	1830.8	516.3	456.4	400.6	446.1
	TOTAL	18890.4	4724.0	4579.9	4941.6	4668.9

TABLE D.21 1985 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
NORTHEAST						
	UTILITY	2703.9	697.0	635.7	690.8	649.4
	IND FUEL COMB	710.1	172.1	178.7	179.1	180.4
	COM/INST/RES	316.4	132.8	79.9	30.8	70.8
	IND PROC	170.9	36.7	44.6	45.4	43.7
	TRANSPORTATION	2980.6	666.3	735.6	788.7	755.3
	MISCELLANEOUS	694.6	215.0	174.6	134.6	166.7
	TOTAL	7576.4	1919.9	1849.0	1869.4	1866.4
SOUTHEAST						
	UTILITY	1432.8	339.0	331.3	404.3	340.3
	IND FUEL COMB	372.9	91.7	93.0	94.1	94.6
	COM/INST/RES	132.0	47.6	31.2	23.6	29.9
	IND PROC	101.1	23.7	26.6	26.1	25.2
	TRANSPORTATION	1314.5	303.6	337.1	336.3	326.3
	MISCELLANEOUS	294.3	80.0	72.7	68.2	72.1
	TOTAL	3647.5	885.6	891.9	952.6	888.4
WEST						
	UTILITY	2201.8	549.4	494.7	620.3	525.7
	IND FUEL COMB	1785.7	448.4	440.0	454.0	450.7
	COM/INST/RES	194.5	89.6	44.8	17.2	41.1
	IND PROC	320.1	73.6	82.1	83.3	81.0
	TRANSPORTATION	2877.6	656.6	720.3	749.9	727.4
	MISCELLANEOUS	940.0	251.5	233.7	219.3	231.2
	TOTAL	8319.7	2069.1	2015.5	2144.0	2057.2
NATIONAL						
	UTILITY	6338.5	1585.4	1461.7	1715.4	1515.5
	IND FUEL COMB	2868.7	712.2	711.7	727.1	725.7
	COM/INST/RES	642.8	270.0	155.9	71.6	141.8
	IND PROC	592.1	134.0	153.2	154.8	149.9
	TRANSPORTATION	7172.7	1626.5	1792.9	1874.9	1809.1
	MISCELLANEOUS	1928.9	546.5	480.9	422.1	470.0
	TOTAL	19543.7	4874.6	4756.4	4966.0	4812.0

TABLE D.22 1986 Sectoral NO_x Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
NORTHEAST						
	UTILITY	2681.6	729.0	634.8	723.0	620.7
	IND FUEL COMB	694.0	172.4	174.7	174.1	174.7
	COM/INST/RES	314.0	134.1	79.3	30.6	70.3
	IND PROC	173.9	39.6	45.5	45.1	43.4
	TRANSPORTATION	3070.4	720.6	807.7	793.8	744.1
	MISCELLANEOUS	708.7	221.7	178.1	137.3	170.1
	TOTAL	7642.6	2017.4	1920.1	1904.0	1823.3
SOUTHEAST						
	UTILITY	1463.6	362.7	336.0	426.1	355.8
	IND FUEL COMB	355.0	88.8	88.4	89.6	89.8
	COM/INST/RES	130.0	46.9	30.7	23.2	29.4
	IND PROC	99.5	23.4	26.2	24.9	24.8
	TRANSPORTATION	1354.1	320.6	349.7	346.9	332.1
	MISCELLANEOUS	300.2	82.5	74.1	69.6	73.5
	TOTAL	3702.5	924.9	905.2	980.3	905.4
WEST						
	UTILITY	2110.1	538.8	438.5	605.7	527.9
	IND FUEL COMB	1632.3	420.7	401.5	412.5	409.6
	COM/INST/RES	192.9	90.9	44.4	17.1	40.8
	IND PROC	328.7	77.1	84.0	83.8	82.8
	TRANSPORTATION	2964.5	690.5	737.4	772.8	751.2
	MISCELLANEOUS	959.2	259.3	238.4	223.8	235.9
	TOTAL	8187.8	2077.3	1944.2	2115.6	2048.3
NATIONAL						
	UTILITY	6255.3	1630.6	1409.4	1754.8	1504.5
	IND FUEL COMB	2681.2	682.0	664.5	676.2	674.1
	COM/INST/RES	636.9	271.9	154.5	70.9	140.5
	IND PROC	602.1	140.1	155.7	153.8	151.0
	TRANSPORTATION	7389.1	1731.7	1894.8	1913.5	1827.4
	MISCELLANEOUS	1968.2	563.5	490.7	430.7	479.6
	TOTAL	19532.8	5019.6	4769.6	4999.9	4777.0

D.3 VOC EMISSIONS

TABLE D.23 1985 Sectoral VOC Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN85-DEC85	WINTER DEC84-FEB85	SPRING MAR85-MAY85	SUMMER JUN85-AUG85	FALL SEP85-NOV85
NORTHEAST						
	UTILITY	14.8	4.1	3.4	3.7	3.5
	IND FUEL COMB	30.1	8.2	7.5	7.0	7.4
	COM/INST/RES	1502.0	684.2	382.2	107.5	328.1
	IND PROC	3279.3	798.1	818.7	831.1	832.1
	TRANSPORTATION	3246.6	858.3	815.9	781.0	806.1
	MISCELLANEOUS	1060.0	258.2	265.9	267.9	268.1
	TOTAL	9132.9	2611.2	2293.6	1998.2	2245.4
SOUTHEAST						
	UTILITY	7.1	1.8	1.6	2.1	1.7
	IND FUEL COMB	45.1	11.5	11.3	11.3	11.3
	COM/INST/RES	409.2	210.6	90.8	26.0	81.8
	IND PROC	1881.7	459.9	470.4	475.1	476.7
	TRANSPORTATION	1369.0	339.6	350.9	346.1	338.3
	MISCELLANEOUS	517.4	105.8	132.5	139.2	139.9
	TOTAL	4229.6	1129.2	1057.4	999.7	1049.7
WEST						
	UTILITY	15.0	3.8	3.3	4.3	3.6
	IND FUEL COMB	58.7	15.5	14.5	14.4	14.5
	COM/INST/RES	531.7	244.3	125.0	48.2	114.2
	IND PROC	3409.0	828.2	847.1	868.8	865.4
	TRANSPORTATION	2562.3	645.8	645.2	647.1	635.1
	MISCELLANEOUS	1322.6	234.0	343.5	371.1	374.0
	TOTAL	7899.3	1971.6	1978.6	1953.9	2006.9
NATIONAL						
	UTILITY	36.9	9.7	8.4	10.0	8.8
	IND FUEL COMB	134.0	35.2	33.3	32.7	33.3
	COM/INST/RES	2442.9	1139.2	597.9	181.7	524.1
	IND PROC	8570.0	2086.1	2136.2	2175.0	2174.2
	TRANSPORTATION	7177.9	1843.7	1812.0	1774.2	1779.5
	MISCELLANEOUS	2900.0	598.0	741.8	778.2	782.0
	TOTAL	21261.8	5712.0	5329.7	4951.8	5302.0

TABLE D.24 1986 Sectoral VOC Emissions by Geographic Region and Season (10^3 t)

		ANNUAL JAN86-DEC86	WINTER DEC85-FEB86	SPRING MAR86-MAY86	SUMMER JUN86-AUG86	FALL SEP86-NOV86
NORTHEAST						
	UTILITY	15.0	4.0	3.5	4.1	3.5
	IND FUEL COMB	27.7	7.8	6.9	6.5	6.8
	COM/INST/RES	1501.8	684.2	382.2	107.4	328.1
	IND PROC	3251.3	791.7	807.7	826.2	827.5
	TRANSPORTATION	3087.4	817.1	775.7	743.3	766.7
	MISCELLANEOUS	1060.0	258.2	265.9	267.9	268.1
	TOTAL	8943.3	2563.0	2241.9	1955.4	2200.7
SOUTHEAST						
	UTILITY	7.5	1.8	1.7	2.3	1.8
	IND FUEL COMB	44.6	11.2	11.1	11.2	11.1
	COM/INST/RES	409.2	210.6	90.8	26.0	81.8
	IND PROC	1870.9	462.5	467.7	472.4	470.7
	TRANSPORTATION	1307.1	323.9	334.9	330.8	323.2
	MISCELLANEOUS	517.4	105.8	132.5	139.2	139.9
	TOTAL	4156.7	1115.9	1038.7	981.8	1028.6
WEST						
	UTILITY	14.4	3.7	3.0	4.1	3.6
	IND FUEL COMB	55.9	14.8	13.8	13.7	13.8
	COM/INST/RES	531.6	244.3	124.9	48.2	114.2
	IND PROC	3428.0	828.0	847.6	878.4	873.5
	TRANSPORTATION	2456.4	617.6	618.2	621.1	609.3
	MISCELLANEOUS	1322.6	234.0	343.5	371.1	374.0
	TOTAL	7808.8	1942.3	1951.0	1936.7	1988.4
NATIONAL						
	UTILITY	37.0	9.5	8.3	10.5	8.9
	IND FUEL COMB	128.2	33.8	31.9	31.4	31.8
	COM/INST/RES	2442.6	1139.1	597.9	181.6	524.1
	IND PROC	8550.3	2082.2	2123.0	2177.0	2171.8
	TRANSPORTATION	6850.8	1758.6	1728.8	1695.3	1699.2
	MISCELLANEOUS	2900.0	598.0	741.8	778.2	782.0
	TOTAL	20908.9	5621.2	5231.6	4874.0	5217.7